





The Milbank Memorial Fund  
**QUARTERLY**

CONTENTS

	Page
IN THIS ISSUE	219
A SURVEY OF NUTRITIONAL STATUS AMONG SCHOOL CHILDREN AND THEIR RESPONSE TO NUTRIENT THERAPY <i>John H. Browe, M.D. and Harold B. Pierce, Ph.D.</i>	223
CHANGES IN BLOOD VALUES DURING PREGNANCY AND THE RELATION OF PROTEIN LEVELS TO TOXEMIA SYMPTOMS <i>Dorothy G. Wiehl</i>	238
THE UNITED STATES "POINT FOUR" PROGRAM <i>Samuel P. Hayes, Jr.</i>	263
POPULATION INCREASE AND MANPOWER UTILIZATION IN IMPERIAL JAPAN <i>Irene B. Taeuber</i>	273
SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY: X. FERTILITY PLANNING AND FERTILITY RATES BY RELIGIOUS INTEREST AND DENOMINATION <i>Ronald Freedman and P. K. Whelpton</i>	294
ANNOTATIONS	
Mental Health in Modern Society Studies in Population	<i>Katherine Simon</i> 344 <i>Vasilios G. Valaoras, M.D.</i> 345

Vol. XXVIII

JULY 1950

No. 2

Edited by the Technical Staff

Published quarterly by the MILBANK MEMORIAL FUND, 40 Wall Street,  
New York 5, New York. Printed in the U.S.A. Subscription: \$1.00 a year.

For the past fifteen years, the Annual Memorial Fund have served as a focal center for solving problems in the fields of medicine, and demography.

The 1948 Conference brought together with the problems of organizing machine-adequate and comparable social and economic conditions as possible. The need for such studies has never before by the programs and activities of the United Nations and its specialized agencies. Such studies of this kind are virtually non-existent in many countries. In the most advanced countries, the problems too frequently encountered in the social sciences are the volume PROBLEMS IN THE COLLECTION AND ANALYSIS OF NATIONAL STATISTICS the historical background of international statistics are presented and the problems currently in progress are discussed.

The public health of the future will be determined by the progress with chronic diseases and the health process will depend more largely than at present on the cooperation of practicing physicians. The public health workers in the field of social welfare and the practice of social medicine calls for greater cooperation from the practitioners of all these three fields. The problems are focussed upon maintenance of the public health. The table at the Conference was devoted to the environment as a factor in the etiology of disease. The discussions in the volume THE FAMILY AND THE PUBLIC HEALTH from the points of view of leaders from the health, and social medicine.



Annual Conferences of the Milbank  
 center for the discussion of un-  
 medicine, public health, social med-

ther two groups, the one concerned  
 machinery for the collection of ade-  
 nomic statistics for as many coun-  
 uch statistics has been pointed up  
 activities planned by the United  
 les. However, statistics of any  
 many undeveloped areas that con-  
 's population. Furthermore, even  
 problem of incomparability is all  
 social and economic statistics. In  
 ION AND COMPARABILITY OF INTERNA-  
 background and future outlook for  
 ted and nine phases of the work

will undoubtedly concern itself  
 problems of the aged. Its suc-  
 at present upon the work of prac-  
 alth worker will need to keep in  
 ysicians on the one hand and with  
 are on the other. For the prac-  
 greater team work than ever before  
 three professions whose efforts  
 public health. The second round  
 to the discussion of social en-  
 gy of disease. The papers and  
 LY AS THE UNIT OF HEALTH present  
 the fields of medicine, public



## IN THIS ISSUE

**T**HE article entitled "A Survey of Nutritional Status among School Children and Their Response to Nutrient Therapy" by Drs. John H. Browe and Harold B. Pierce, first presented at the Round Table on Nutrition in Relation to Health and Disease last November, now appears in this issue. It sets forth the results of a study with school children of Burlington, Vermont, showing signs of deficiency states in their conjunctivae, gums, or tongues, who were divided accordingly into three groups and given specific nutrient therapy for three years: vitamin A to the first group; ascorbic acid to the second; and niacin to the third. The changes occurring in these groups under specific therapy were contrasted with those of matched controls receiving placebos. It was found that the responses of the former to the appropriate type of therapy were statistically significant.

The rate of recession under therapy corresponded to the form of the pathology in the tissue; the subacute responded much more rapidly than did the chronic. Only after approximately two years did the recession of the chronic process become readily observable.

• • •

In a paper on "Changes in Blood Values During Pregnancy and the Relation of Protein Levels to Toxemia Symptoms" by Dorothy G. Wiehl, an analysis is made of the variations in hematological values, in total serum protein, and in albumin and globulin throughout the prenatal period for a large group of women. When the effect of the increase in plasma volume during pregnancy found by several investigators is taken into account, the observed data on hematological values, on total

protein, and on albumin indicate an accelerated production of these blood constituents, although the actual concentration decreases. The concentration of serum globulin actually increases. Symptoms of toxemia of pregnancy occurred most frequently among women whose albumin values were below the average for all women early in pregnancy or declined in the latter half of pregnancy to less than average levels. This report is one of a series given at the Round Table on Nutrition in Health and Disease, which was a part of the Annual Conference of the Milbank Memorial Fund, November 16-17, 1949.

• • •

The two previous issues of the *Quarterly* have carried seven of the ten papers given at the Round Table on Modernization Programs in Relation to Human Resources and Population Problems, held in connection with the 1949 Annual Conference of the Milbank Memorial Fund. Two additional papers from this series are presented in this issue. All will be available soon in the form of a volume constituting part of the proceedings of the Conference.

In the paper "The United States Point Four Program," Mr. Samuel P. Hayes, Jr., of the Department of State, discusses Point Four from the standpoint of general objectives and major provisions, relation to the United Nations program of technical assistance, implication for our national foreign policy, and "general principles" that the author thinks should govern the operation of the program on the basis of past experience in rendering technical assistance to underdeveloped areas. The timeliness of this paper has been enhanced by the recent passage of legislation affecting the Point Four Program.

Past experience indicates that modernization brings reductions in death rates before it brings reductions in birth rates and hence tends to be followed by a period of rapid population growth. One of the problems engendered is that of providing employment for the expanding labor force of an increasing population. A description of how this problem was met in Japan, the most industrialized country of the Orient, is given in the paper "Population Increase and Manpower Utilization

in Imperial Japan," by Dr. Irene B. Taeuber of the Office of Population Research, Princeton University.

• • •

The tenth of a series of articles being published in the *Quarterly* under the general title "Social and Psychological Factors Affecting Fertility" appears in this issue under the sub-title "Fertility Planning and Fertility Rates by Religious Interest and Denomination" and under the authorship of Dr. Ronald Freedman of the University of Michigan and Professor P. K. Whelpton of the Scripps Foundation for Research in Population Problems. The paper presents an analysis of "Indianapolis Study" materials collected for the purpose of testing an hypothesis regarding the interrelation of interest in religion, fertility-planning, and size of planned family.



## A SURVEY OF NUTRITIONAL STATUS AMONG SCHOOL CHILDREN AND THEIR RESPONSE TO NUTRIENT THERAPY

JOHN H. BROWE, M.D.<sup>1</sup> AND HAROLD B. PIERCE, PH.D.<sup>2</sup>

THIS paper describes the clinical changes which occurred in certain tissues in a group of school children that received specific nutrient therapy. The study<sup>3</sup> was conducted under the direction of Dr. H. B. Pierce and under the auspices of the University of Vermont, College of Medicine, in Burlington. One hundred and twenty-four children were studied for about three years. These children were selected from 908 grade-school students who were screened for evidence of vitamin deficiency disease in the late fall of 1945 in Burlington.

The methods, data, and analyses of the chemical and dietary studies will be published in a subsequent paper.

These 124 children were given a physical inspection of the eyes, lips, gums, tongue, and skin in the fall of 1946. This was repeated each spring and fall, the final inspection being made early in the spring of 1949. Color photographs of all these tissues were made on each child on the occasions of the first, mid, and last physical inspections, about twelve months apart. Photographs of tissues under special observation in each group were taken at six-month intervals, to form a series of six photographs.

The children were divided into three groups on the basis of the clinical inspection. The commonly accepted changes in the conjunctiva, gum and tongue were the criteria for placing them

<sup>1</sup> Formerly Research Associate in Medicine, College of Medicine, University of Vermont and Medical Consultant in Nutrition, Vermont Department of Health; at present Acting Director, Bureau of Nutrition, New York State Department of Health.

<sup>2</sup> Chairman, Department of Biochemistry, College of Medicine, University of Vermont.

<sup>3</sup> Acknowledgement is made to Merck & Company, The Milbank Memorial Fund, and the National Vitamin Foundation, Inc. for their generous financial support.

Acknowledgement is also made to Gelatin Products Division, R. P. Scherer Corporation, Eli Lilly and Co., and Merck & Company for the provision of materials used in this study.



in groups to study the effects of vitamins A, C and niacin, respectively (1, 2, 3, 4).

The children in each of the three groups were divided into two subgroups in which they were paired by stage and severity of lesions, by sex, and finally age. This was done to establish more comparable subgroups than might be achieved by a random selection. In each instance one subgroup then received vitamin therapy; its paired subgroup, placebos.

Therapy consisted of about four times the Recommended Daily Allowances of the Food and Nutrition Board of the National Research Council. Vitamin A was administered in a single daily dose of 25,000 International Units. A total of 200 milligrams of ascorbic acid was given daily in two divided doses. Niacinamide was given in the amount of forty milligrams, half the dose twice daily. The corresponding subgroups received comparable placebos. Four times the Recommended Allowances is a little less than some authorities administer as therapeutic dosage.

#### PLATES 1-6

Fig. 1. Initial photograph of a conjunctiva showing generalized thickening, with even greater thickening and opacity in a triangular area in the region at the junction of the limbus and horizontal meridian.

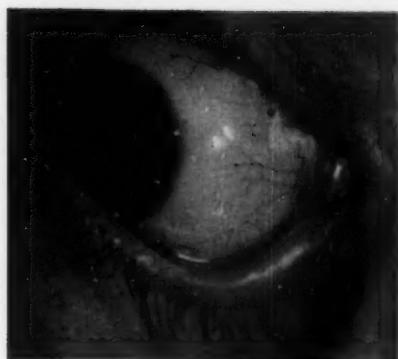
Fig. 2. The same conjunctiva as it appears seventeen months after the beginning of vitamin A therapy. No change is evident.

Fig. 3. Twenty-two months after the beginning of therapy, the first evidence of decrease in the generalized thickening of the conjunctiva is seen in the relatively greater prominence of the localized opacity, even though it, too, has shared in this recession.

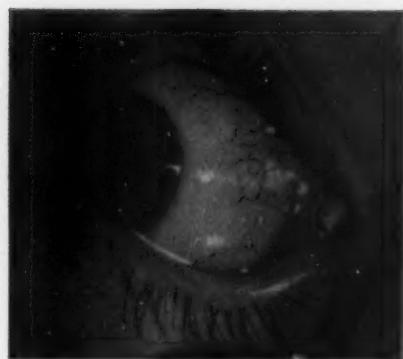
Fig. 4. After twenty-six months had elapsed since the beginning of vitamin A therapy, thinning and clarification has taken place over the entire conjunctiva. Most of the conjunctiva has become thinner and quite transparent superficially; the localized area, originally of greater thickness and opacity, though it has undergone thinning and clarification to the same relative extent under therapy, still shows at this stage some thickness and more or less opacity and consequently presents a seemingly circumscribed appearance.

Fig. 5. This conjunctiva is of a member of the control group. The photograph was made at the same time as Figure 1. The stage of the process is essentially the same.

Fig. 6. The same conjunctiva of the control child shown in Figure 5 as it appears at the end of the therapy period. There is no change comparable to that in the conjunctiva of the child receiving vitamin A therapy.



1



2



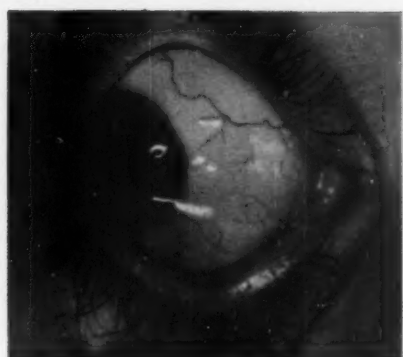
3



4



5



6

#### PLATES 7-12

Fig. 7. Initial photograph of a lower gum which presents recession and superimposed acute changes of redness and swelling of papillae and margins.

Fig. 8. Following four months of ascorbic acid therapy, the acute process is less intense and the swelling is more localized near the margins.

Fig. 9. The same gum shown in figures 7 and 8 at the completion of twenty-six months of therapy shows more tooth surface covered. There is a partial restoration of gum tissue.

Fig. 10. The upper gum of a child in the control group showing recession, swelling, and redness. This is an initial photograph.

Fig. 11. The same gum as in figure 10 at the end of the study also shows recession, swelling, and redness. In fact, there is an increase in swelling and redness.

Fig. 12. This photograph, made before therapy was instituted, shows a red, swollen, and fissured tongue. The fungiform papillae are swollen and most of the filiform papillae are atrophied.



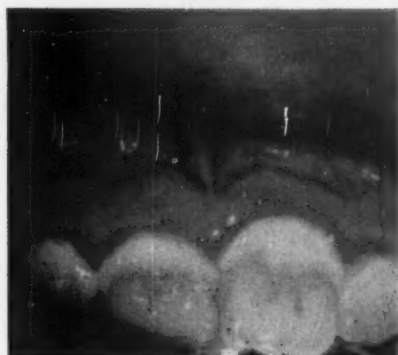
7



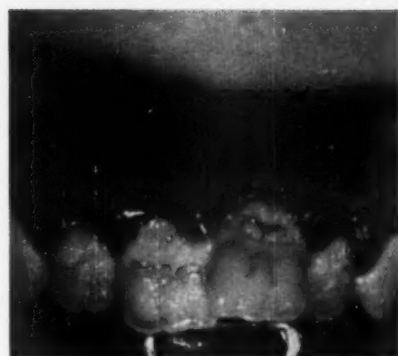
8



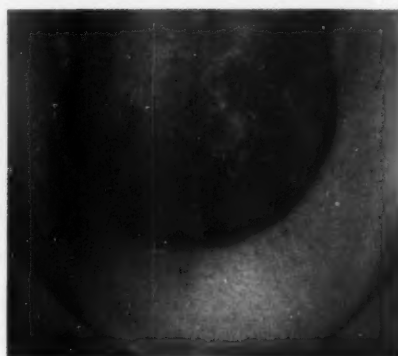
9



10



11



12



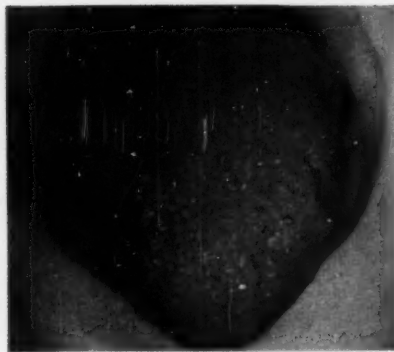
13



14



15



16



17



18

## VITAMIN A

The bulbar conjunctiva in its reported relation to vitamin A was studied. Normally it is a thin, transparent tissue covering the anterior surface of the eyeball except at the cornea. The term sclera is very often mistakenly applied to the white of the eye, which actually includes both conjunctiva and sclera. It should also be mentioned that the epithelial layer exclusively has been commonly regarded as being affected in the conjunctiva in avitaminosis A; but that more recently the subepithelium containing the vascular network has been shown to undergo change always and often predominantly. Most of the changes described in this report are in the subepithelium.

It has been shown (1) that in vitamin A deficiency the conjunctiva becomes thickened, its vascularity increased and its transparency lost. It becomes translucent and then opaque. This process is not uniform over any zone of the conjunctiva. The initial site and therefore the most advanced area is at the junction of the horizontal meridian with the limbus with the process originating in the deeper layer. This describes briefly the pathology of the underlying chronic process on which may be superimposed from time to time an acute or subacute proc-

## PLATES 13-18

Fig. 13. Following niacin therapy, the tongue shown in Figure 12 has decreased in redness. There is less swelling of the fungiform papillae and a beginning restoration of the filiform papillae.

Fig. 14. This pre-therapy tongue presents moderate fissuring.

Fig. 15. Following niacin therapy the most striking difference from Figure 14 is the substantial amount of filling in of the fissures.

Fig. 16. The initial photograph of the tongue of a control child. There are "slashes" on the tongue margins and the fungiform papillae are swollen.

Fig. 17. The same tongue fifteen months later in which a more acute process is superimposed. The tongue is red and swollen. The marginal "slashes" are more evident and there is an area in which most of the papillae have disappeared.

Fig. 18. In the final picture of the same tongue shown in Figures 16 and 17, the acute process has subsided. However, the swelling remains in the tongue. In addition to the marginal "slashes," fissures have appeared on the dorsum. In this photograph taken at the end of the study, the tongue is very little different than it was initially.

ess which appears and recedes much more rapidly (5). The acute manifestations include hyperemia and congestion of the conjunctiva, followed by swelling and finally infiltration.

Figure 1 presents a photograph of a conjunctiva exhibiting the changes indicative of a chronic process as it appeared before therapy. The area with the most advanced change is in the region of the horizontal meridian at its intersection with the limbus. This roughly triangular area is thicker than the remaining conjunctiva and is completely opaque. Only the most superficial vessels are seen with any degree of clarity. One can look a little deeper into the rest of the conjunctiva; but the vessels appear progressively fainter. Increased vascularity is a part of this process. However, in the advanced stage, the opacity of the conjunctiva effectively hides any but the uppermost vessels from view.

From a photograph (Figure 2) of the same zone in the same child taken seventeen months after the beginning of therapy, no demonstrable change in the conjunctiva can be seen. However, in Figure 3, taken twenty-two months after the beginning of therapy, the opacity is seen to be clearly demarcated. It is the first demonstrable change. In the final picture (Figure 4) of this conjunctiva, taken about twenty-six months after the beginning of therapy, the opacity in the site of most advanced change is definitely circumscribed. The vessels in the areas just above and below are seen more clearly as a result of thinning and superficial clarification of the conjunctiva (1).

Photographs of the same zone in the conjunctiva of a member of the vitamin A control group are presented for comparison. Figure 5 is of a picture taken at the beginning of the study; Figure 6, at the completion. Between these two pictures there is no evident difference in any way corresponding to the changes seen in the conjunctiva of the child receiving vitamin A therapy.

#### VITAMIN C

The gums were under observation for the effects of vitamin C therapy on them. Normally the gum extends slightly over



the enamel and, as interdental papillae, between the teeth for half the distance of their exposed length. It is thin, pink, and elastic in consistency. Hugging the teeth rather tightly, it provides some measure of support for them.

It has been shown (2) that when the gingival tissue is deficient in vitamin C for a period of time, it becomes more or less swollen and pale, followed by atrophy of its substance. The interdental papillae lose in height, and sometimes even their identity. The marginal gingiva gradually recedes, exposing more and more tooth surface and providing less support.

Usually this process is masked by more acute changes. These consist of redness and swelling of the gum, often with secondary infection.

In the age group under observation the shedding and eruption of teeth brought into play terrific stresses on the gums and therefore added to the nutrient demands of the tissue.

Figure 7 shows the pathological changes in a lower gum prior to therapy. There is a marked recession of the gingival tissue with a superimposed acute process of a moderately severe nature. Figure 8 presents the same gum as it appeared four months after therapy was begun. Although there is no apparent rebuilding of the gum substance in this short time, the stage is being set. The swelling is more localized near the margins and the acute process is less intense.

In Figure 9 this gum is shown at the termination of therapy (2). What was suggested by the previous photograph is now seen to have progressed to a partial restoration of gum tissue. The gums cover more tooth surface; the pathological process has actually undergone reversal. But not until about twenty months had elapsed from the beginning of therapy was any significant improvement of this nature noted.

Figures 10 and 11 are of the lower gum of a child in the control group. The former was taken at the beginning, the latter at the end of the study. In both, recession, swelling, and redness may be seen. No changes comparable to those noted in the gum of the child receiving vitamin C therapy have oc-

curred. In fact, the gum is obviously in much poorer condition at the conclusion of the study.

### NIACIN

The tongue was observed for effects of niacin therapy. Normally, the anterior two-thirds of the tongue is covered predominantly by filiform papillae. Of the fungiform papillae, 90 per cent are in the interior fifth, with the remainder distributed throughout. It has been shown (3) that with a long time deficiency of niacin in this tissue, the papillae at first hypertrophy, then atrophy. In undergoing this sequence of changes, the fungiform precede the filiform papillae. Those at the tip and on the margins are affected first and then those on the dorsum are reached. If the pathological process reaches a later stage, fissures may appear.

At any time during this sequence of events, acute manifestations may arise and may effectively hide the underlying process. These changes consist in redness and swelling of the tongue substance as well as of the papillae.

Photographs of the tongues of two children before and after niacin therapy are presented in Figures 12-15. In Figure 12 the tongue of a child before therapy is seen to be red, swollen, and fissured. The fungiform papillae are swollen as well, and most of the filiform are atrophied. In the picture taken after termination of therapy (Fig. 13), the redness is shown to have decreased. The fungiform papillae are less swollen, and there is beginning restoration of the filiform papillae (3). In the tongue of another child the most striking difference between its appearance before (Fig. 14) and after therapy (Fig. 15) is in the substantial amount of filling in of the fissures that has occurred.

In each of these two sets of pictures a beginning reversal of the chronic process is noted. From comparison of the last picture in each set (Figs. 13 and 15), it may be observed that the status of the tongue in Figure 15 is closer to a normal appearance than is that in Figure 13. This observation brings out

the fact that the final status attained after therapy within a given time period is dependent on the status of the tissue at the outset. This holds true not only for the tongue, but for the other tissues as well.

Changes in the tongue of one of the niacin controls receiving placebos illustrates the waves of exacerbation and subsidence that may occur in the natural course of a deficiency state. In contrast to the status before therapy (Fig. 16), six months later a subacute exacerbation appeared, superimposed on the underlying chronic process (Fig. 17). Five months thereafter the exacerbation abated but not to the point that the status was similar to that at the beginning of the study. In an additional five months, another exacerbation appeared which was not so intense as the previous one. Four months subsequently the subacute process is intensified; while in another seven months it shows a slight subsidence. (Fig. 18.)

#### AMOUNTS TAKEN

Therapy was begun in mid-December, 1946, and was terminated at the end of January, 1949, a total of twenty-six months or seven hundred and seventy days. Therapy and placebos were given under supervision on school days, but this supervision frequently was not as close as desired. The children were encouraged to take therapy or placebos when school was not in session. Some took advantage of this; many did not.

If there is any discrepancy between the records submitted and the actual performance—and it is reasonable to suppose that there is—the actual performance is apt to be poorer than the figures indicate. Also some of the performances were consistent throughout; on the other hand, some took more of their therapy in the first half of the study, others in the second half. These variations were very great. Since both omission and variation in taking therapy have a direct bearing on the results, tending to minimize them, data on performance takes on considerable significance.

Table 1 shows the performance, according to the records

NUMBER OF DAYS	VITAMIN A		ASCORBIC ACID		NIACIN	
	Number of Children	Number Improved	Number of Children	Number Improved	Number of Children	Number Improved
TOTAL	24	11	21	7	19	13
< 300	1	0	2	0	0	0
300-424	6	1	7	4	6	4
425-549	7	4	6	1	9	7
550-674	8	5	3	0	4	2
> 675	2	1	3	2	0	0

Table 1. Approximate number of days on which specified therapy was taken by all children and by those showing improvement.

submitted, of the children on vitamin A, ascorbic acid, and niacin therapy. The performance is expressed in number of days that therapy has been taken. Although these children had the opportunity of taking therapy for twenty-six months, the performances ranged from twelve to twenty months. Therefore, in no sense did this study provide a measure of effectiveness of certain amounts of therapy over a period of two years; but rather of therapy for about one and one-half years in the one instance and for about one year or slightly more in the other two instances. In the vitamin A group, the mode is between 550 and 674 days; that is, the children in this group took therapy equivalent to somewhat more than eighteen months. An almost equal number fell in the ranges of 300-424 and 425-549 days, or the equivalent of somewhat more than twelve months. The mode for ascorbic acid falls in the 300-424 day range; and for niacin, in the 425-549 day grouping.

### RESULTS

All pictures were examined without knowing whether they were of persons receiving therapy or of controls. In the case of the conjunctiva, the comparison was made on the complete series of six pictures. With the gums, however, the comparisons were made on the series of three pictures only. The

tongues were examined by both of these two procedures. The complete series of six pictures for the children in the therapy and matched control groups were examined first for evidence of improvement. When other control groups were used as well as the matched controls, the series of three pictures per child were studied for all children. The therapy and control segments of the group under study were always unidentifiable in the total number. It should be pointed out that the examination conducted in this manner became a test, not only of the actual change occurring in the tissues, but also of the diagnostic acumen of the examiner. This should be borne in mind in evaluating the results.

Table 2 summarizes the effects of each type of therapy as determined by the examination. The results are expressed by the probability of exceeding by chance alone the observed dif-

Table 2. Comparison of therapy and control groups at end of study.

GROUP	NUMBER OF CHILDREN	TISSUE IMPROVED		DIFFERENCE IN PER CENT IMPROVED		
		Number	Per Cent	(Th.-C.) Per Cent	Probability	Significant
Vitamin A Therapy Controls—Matched  Ascorbic Acid Therapy Controls—Matched Controls <sup>1</sup> —Other Groups  Niacin Therapy Controls—Matched Controls <sup>1</sup> —Other Groups <sup>2</sup>	CONJUNCTIVAL STATUS					
	24	11	45.8			
	23	4	17.4	28.4	.01-.05	Yes
	GUM STATUS					
	21	7	33.33			
	16	1	6.25	27.1	.05	Borderline
	118	2	1.8	31.5	<.001	Yes
	TONGUE STATUS <sup>2</sup>					
	19	13	68.4			
	21	3	14.3	54.1	<.001	Yes
	96	0	0	68.4	<.001	Yes

<sup>1</sup> Includes children in matched control group and other therapy and control groups.

<sup>2</sup> Improvement in tongue includes consistent recession of the subacute process. The total number for controls is smaller because of unreadable pictures.

<sup>3</sup> The absence of the three improved cases among total controls is due to failure to classify these as improved when read on three pictures only.

ference between the therapy and control groups. The arbitrary level of 5 per cent is taken customarily as the upper limit of significance, significant in that these differences would be exceeded by chance not more than once in twenty times that this procedure might be performed.

With vitamin A therapy the findings are significant. When the ascorbic acid therapy group is compared with the matched controls, the difference is at the 5 per cent level. When all children not receiving ascorbic acid, with gums comparable initially to those in the ascorbic acid group, that is, the gums showed at least beginning recession, are included as controls, the difference between the ascorbic acid therapy group and control group is very significant. The differences between the niacin group and matched controls as well as all other groups were both significant. Here, however, because of the masking effect of the subacute process, it frequently was necessary to consider consistent recession of this process indicative of improvement, as the chronic process did not emerge sufficiently until the end of the study.

#### SUMMARY

Twenty-four children with conjunctival changes, twenty-one children with gum changes, and nineteen children with tongue changes received therapeutic amounts of vitamin A, ascorbic acid, and niacin, respectively, for varying periods of time less than two years. In the A group, eleven had demonstrable improvement in the lesions; in the ascorbic acid group, seven improved; and in the niacin group, thirteen improved. In comparing these responses with the various control groups, it was found that these responses were statistically significant.

This study then presents confirmatory evidence that the changes noted by Kruse are the results of chronic deficiency in these specific tissues (1, 2, 3, 5). It also demonstrates that tissues reflecting deficiency states undergo recession and restoration upon provision of therapeutic amounts of the appropriate nutrients.

REFERENCES

1. Kruse, H. D.: Medical Evaluation of Nutritional Status. IV. The Ocular Manifestations of Avitaminosis A, With Especial Consideration of the Detection of Early Changes by Biomicroscopy. *Milbank Memorial Fund Quarterly*, July, 1941, xix, No. 3, pp. 207-240.
2. Kruse, H. D.: The Gingival Manifestations of Avitaminosis C, With Especial Consideration of the Detection of Early Changes by Biomicroscopy. *Milbank Memorial Fund Quarterly*, July, 1942, xx, No. 3, pp. 290-323.
3. Kruse, H. D.: The Lingual Manifestations of Aniacinosis, With Especial Consideration of the Detection of Early Changes by Biomicroscopy. *Milbank Memorial Fund Quarterly*, July, 1942, xx, No. 3, pp. 262-289.
4. Council on Foods and Nutrition, American Medical Association: Vitamin Deficiencies: Stigmas, Symptoms and Therapy. *The Journal of the American Medical Association*, June 22, 1946, 131, pp. 666-667.
5. Kruse, H. D.: A Concept of the Deficiency States. *Milbank Memorial Fund Quarterly*, July, 1942, xx, No. 3, pp. 245-261.



## CHANGES IN BLOOD VALUES DURING PREGNANCY AND THE RELATION OF PROTEIN LEVELS TO TOXEMIA SYMPTOMS<sup>1</sup>

DOROTHY G. WIEHL<sup>2</sup>

CHANGES in the concentration of various constituents in the blood during pregnancy must be considered in relation to the well-known increase in plasma volume. Therefore, as a background for this report on hematological values and serum protein levels obtained for prenatal ward patients in the Study on The Relation of Nutrition to Pregnancy, now in progress at the Pennsylvania Hospital, some data will be presented from two studies on the increase in plasma volume during pregnancy.

In a recent report, Caton and others (1) published for ten patients at the Boston Lying-In Hospital the results of serial observations on prenatal and postpartum plasma volume and volume of red blood cells (hematocrit). Of these, one was a mild pre-eclamptic and one had a premature birth. From the estimates of total plasma volume for the eight presumably normal cases reported at four to seven antepartum periods for each patient and a postpartum value taken 26 to 66 days after delivery, the average per cent by which the antepartum plasma volume exceeded the postpartum volume was calculated for six different antepartum periods.<sup>3</sup> The estimated curve for

<sup>1</sup> This is a preliminary report on data from a Study on The Relation of Nutrition to Pregnancy, being conducted at the Pennsylvania Hospital (Philadelphia Lying-In Hospital), Philadelphia, under the direction of Dr. Winslow T. Tompkins. The Study is receiving support from the Milbank Memorial Fund, the Williams-Waterman Fund, the National Vitamin Foundation, the Nutrition Foundation, the Upjohn Company, Mead Johnson and Company, E. R. Squibb & Sons, and Mulford Colloidal Laboratory.

<sup>2</sup> The Milbank Memorial Fund, statistical consultant to the Study.

<sup>3</sup> Determinations of total plasma volume were not made at uniform periods of pregnancy for all cases, but most of the observations could be grouped in periods having a three-week range. In order not to widen the range nor to omit cases, several values used were interpolations between two observations made at an earlier and later week of gestation. The average for the final period before delivery is for 0 to 11 days. For one of the eight patients the earliest antepartum plasma volume (11 weeks of gestation) was 5 per cent less than the postpartum plasma volume, and for this case the earliest antepartum volume was taken as the base from which the percentage increase was computed.

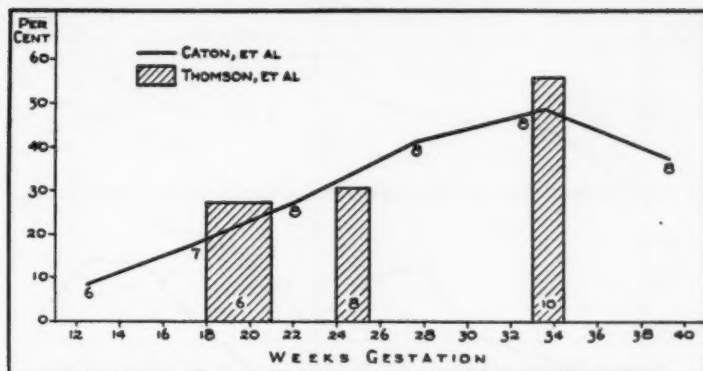


Fig. 1. Percentage increase in total plasma volume during pregnancy over postpartum plasma volume estimated from data published by Caton, *et al.* (1) and from Thomson, *et al.* (2). Numbers indicate number of determinations on which average increase is based.

plasma volume increase obtained from these data is shown in Figure 1. The curve rises from 9 per cent at about 12 weeks of gestation to 48 per cent at 33 weeks, then decreases in the last ten days before delivery to 37.5 per cent.

On the same chart the three bars show the average per cent above postpartum plasma volume calculated<sup>4</sup> from data published by Thomson, *et al.* (2). The two studies do not differ significantly when the small number of cases and variation among individual patients are considered.

The wide differences among patients in the changes in plasma volume during pregnancy are apparent from the individual curves plotted in Figure 2 for the eight cases studied by Caton, *et al.* The maximum antepartum volume exceeded the postpartum volume by 36 to 72 per cent and always occurred in the third trimester. The plasma volume decreased significantly

<sup>4</sup> The average percentages for excess in plasma volume during pregnancy over the postpartum plasma volume shown in Figure 1 for the data from Thomson, *et al.* are based on a total of eleven cases for which one to four antepartum plasma values were reported. One case with anemia and edema was excluded. The average percentages are for a range of 3 weeks at 18 to 20 weeks of gestation, a range of 11 days at 24 to 25 weeks of gestation for six of the eight cases included, and a range of 10 days at 33 to 34 weeks of gestation for six of the nine cases included. Postpartum plasma volume was at 11-14 days after delivery for eight cases; at 20, 43, and 68 days for the other three.

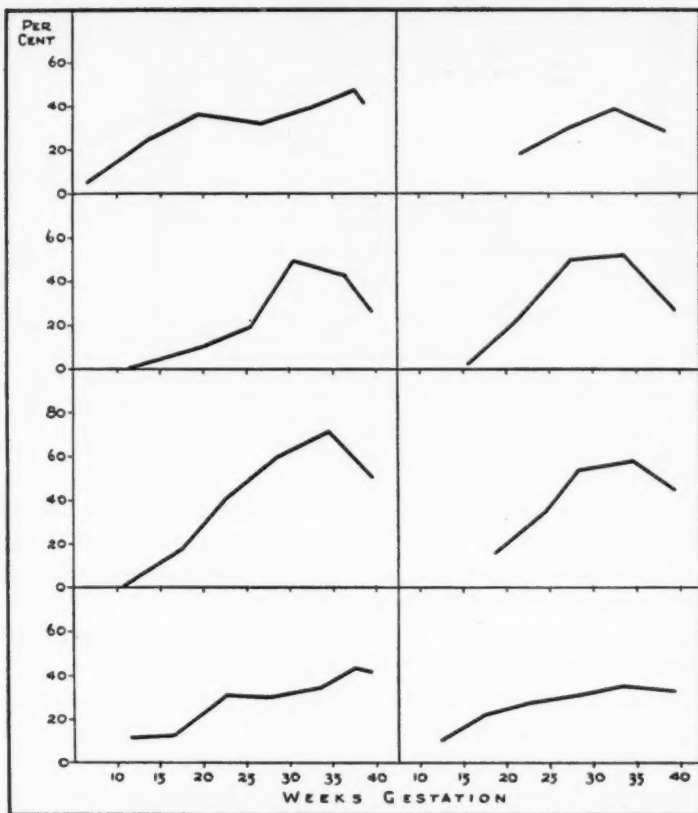


Fig. 2. Individual curves for percentage increase in plasma volume during pregnancy for eight women studied by Caton, *et al.* (1).

before delivery in five of the eight cases. It is apparent that some cases had shown little or no increase in plasma to the end of the first trimester, but for one case plasma volume at 13 weeks was 25 per cent above the postpartum value and was 5 per cent above at 6 weeks. In general, there seems to be a sharp increase in plasma volume throughout the second trimester and during the first half of the third trimester, after which the plasma volume tends to remain constant or to decrease.

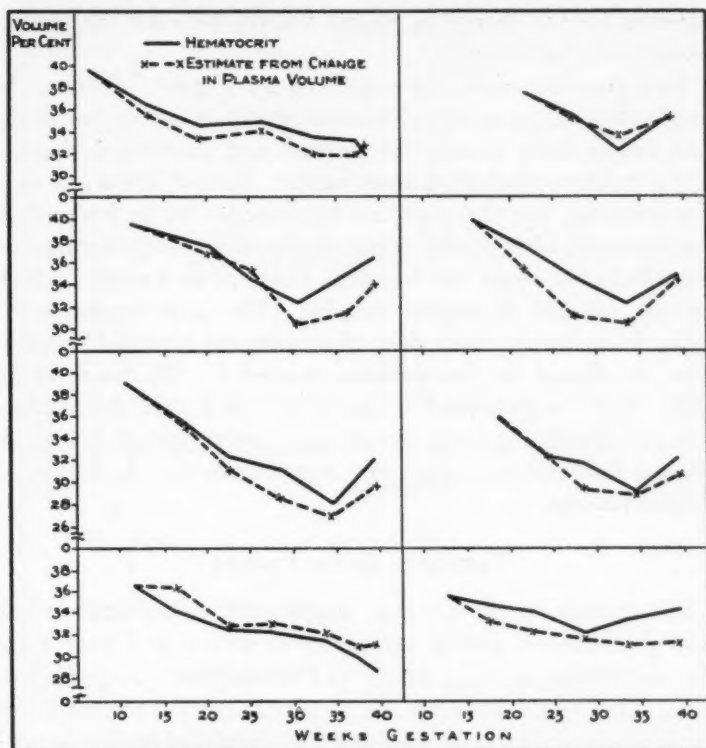


Fig. 3. Hematocrit values obtained during pregnancy for eight women studied by Caton, *et al.* (1) compared with changes in hematocrit values from first determination that would be expected as result of the observed individual plasma volume changes.

If no change in the total volume of circulating red cells occurs, the hematocrit could be expected to decrease in proportion to the dilution caused by the increase in plasma volume. In Figure 3, the reported hematocrits for the eight cases are shown together with the hematocrits that might be expected as a result of the observed increase in plasma volume. For each case the reported total plasma volume and hematocrit for the earliest period in pregnancy is used as a base and each later hematocrit is estimated by computing the hematocrit

expected for the change in plasma volume between the earliest period and a later period.

Two generalizations are suggested by Figure 3. First, the fluctuations in the observed hematocrits from one period to the next follow fairly closely the upward and downward changes in the estimated expected hematocrit.<sup>5</sup> Second, there is a definite tendency for the expected hematocrits to be lower than the observed, that is, the actual decrease in the percentage of red cells in the blood was less than expected as a result of dilution on account of plasma increase. The same tendency for higher hematocrit values than the estimated expected hematocrits was found for the patients studied by Thomson, *et al.* Thus, these two studies have given evidence that the production of red cells increased during pregnancy, though not in an amount sufficient to completely compensate for the increased plasma volume.

#### TRENDS IN BLOOD VALUES

The change in the average hematocrit values and in the hemoglobin levels during pregnancy is shown in Figure 4 for 161 white women in the Study at Philadelphia Lying-In Hospital. The broken lines are the average values expected if the levels before and after 17 weeks of gestation<sup>6</sup> had varied in proportion to the average change in plasma volume shown by the data from Caton, *et al.*

From 12 to 17 weeks of gestation both hematocrit and hemo-

<sup>5</sup> Each estimated hematocrit is affected by the accumulated errors of two plasma volume determinations (the earliest and a later value) and of the earliest hematocrit reading. The curves obtained for the estimated hematocrit values suggest a high degree of accuracy for the plasma volume determinations. The one case for which the expected hematocrit values were consistently higher than the observed hematocrit values could result from error in the earliest determination of either the plasma volume or hematocrit. If the second period (16 weeks of gestation) is used as a base, the usual lower estimate than observed hematocrit is obtained.

<sup>6</sup> The expected average levels in the blood constituents are estimated from the observed level at 17 weeks because nearly all women included in the group for which average curves were obtained were observed at 16-18 weeks of gestation and also because the average plasma volume increase at this period was more reliable statistically than the average at 12 weeks. The weeks of gestation used for all cases except those resulting in premature births (5.5 lbs. or less) are computed from date of delivery using delivery date as 280 days.

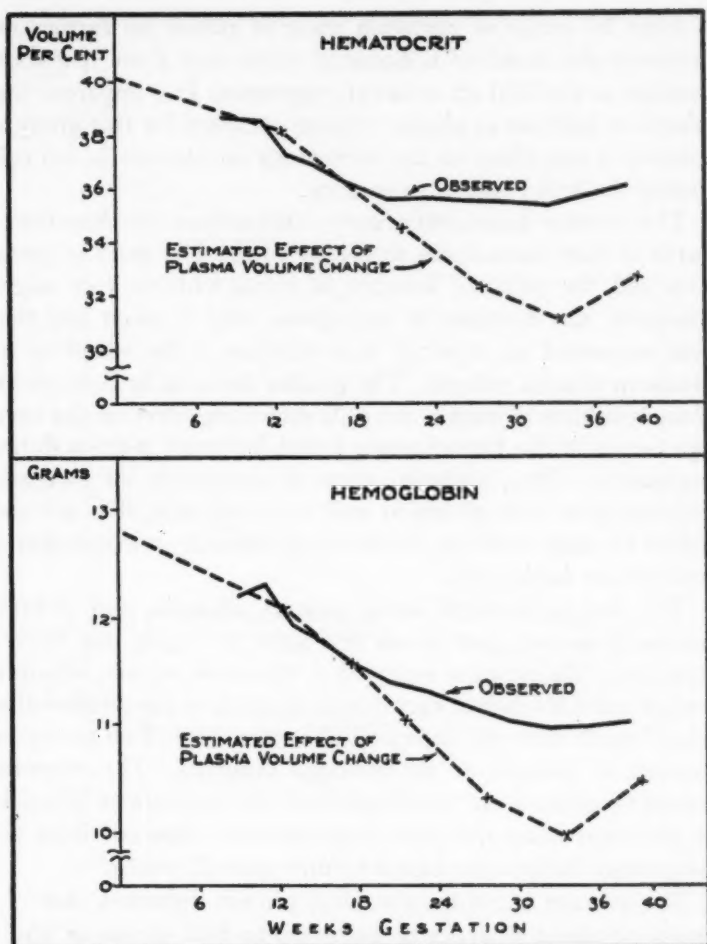


Fig. 4. Average hematocrit and average hemoglobin values during pregnancy for 161 white ward patients at Pennsylvania Hospital and average levels expected on basis of percentage plasma volume change before and after 17 weeks of gestation.

globin values decrease quite rapidly and the amount of the decrease is very close to that estimated from plasma volume change.

After 20 weeks of gestation there is almost no further decrease in the observed hematocrit values and there is a slight increase in the final six weeks of pregnancy. It is apparent that whatever increase in plasma volume occurred for this group of women, it was offset on the average by an increase in red cells during the latter half of pregnancy.

The average hemoglobin curve differs from the hematocrit curve in that it continues to decline to the 31st week of gestation and the terminal increase in hemoglobin is very slight. However, the decrease in hemoglobin also is much less than that estimated as expected from dilution of the value by increase in plasma volume. The greater decrease in hemoglobin than in volume of packed red cells shows the effect on the average curves of the hypochromia found for many women during pregnancy. Thus, although there is apparently an increased production of hemoglobin as well as of red cells, it is not sufficient in many cases to maintain the normal concentration of hemoglobin in the cells.

The changes in total serum protein, albumin, and globulin during pregnancy are shown in Figure 5. Again, the broken lines show the changes expected if the total protein, albumin, and globulin levels had varied in proportion to the dilution that would result from the increased plasma volume if no change in amount of protein or its fractions occurred. The expected values for protein are estimated from the averages at 12 weeks of gestation using the percentage decrease expected from the percentage increase in plasma volume after 12 weeks.<sup>7</sup>

The average curve for the total protein decreases from 7.1 grams at about 8 weeks of gestation to 6.65 grams at 16-18 weeks, and thereafter shows little change with a minimum level of 6.5 grams at 31-33 weeks. The average values for serum

<sup>7</sup> The average plasma volume change from 12 to 17 weeks of gestation has been shown to fit very closely the change in hematocrit and hemoglobin values, and therefore the plasma volume at 12 weeks seems to afford as satisfactory a base for estimating expected changes in blood constituents as the value for 17 weeks. Since globulin starts to rise after 12 weeks of gestation, the comparison of observed levels with expected levels is better if the two curves are brought together at 12 weeks or earlier.



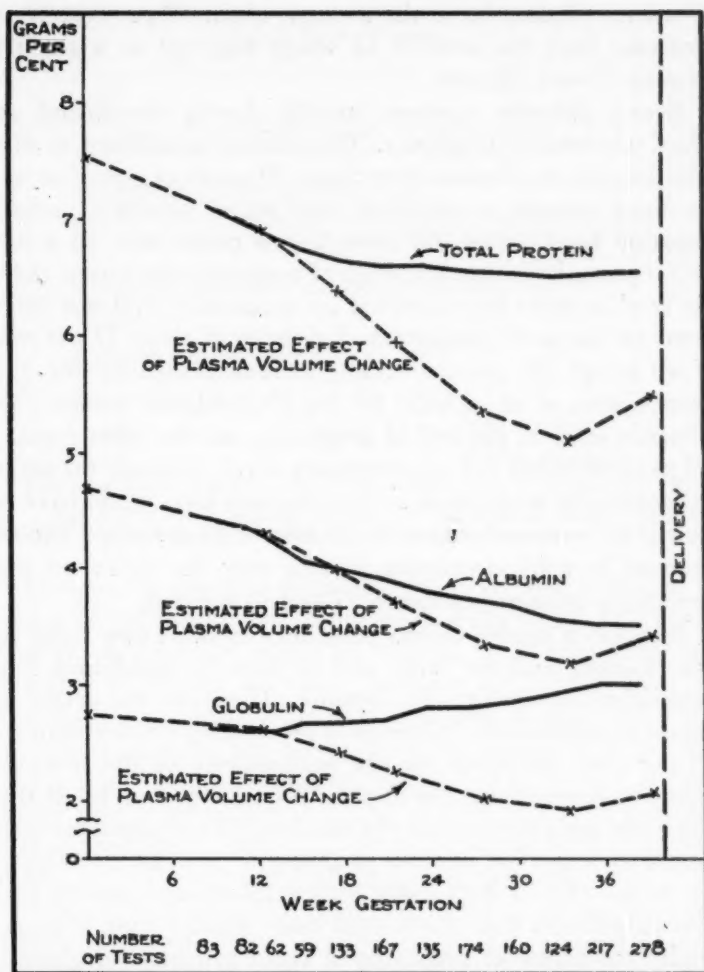


Fig. 5. Average total serum protein, serum albumin, and serum globulin for white ward patients at the Pennsylvania Hospital, Nutrition Research Clinic, and average levels expected on basis of percentage plasma volume change before and after 12 weeks of gestation.

albumin, however, decreased throughout pregnancy, declining from 4.4 grams to 3.5 grams. At the lowest level the decrease

in serum albumin is, on the average, about 70 per cent of the decrease from the level at 12 weeks expected as a result of plasma volume dilution.

Serum globulin increases steadily during the second and third trimester of pregnancy. This increase is sufficient to offset the decrease in albumin after about 20 weeks of gestation and, as noted already, to maintain total serum protein at a fairly constant level during the latter half of pregnancy. At a level of 3.0 grams in the last six weeks of pregnancy the serum globulin level is above the estimated pre-pregnancy level and represents an increased production of globulin of about 57 per cent, if we accept the plasma volume increase shown by the data from Caton, *et al.* as valid for the Philadelphia women. The albumin level at the end of pregnancy, on the other hand, is 25 per cent below the pre-pregnancy level, although the serum concentration maintained at the minimum level would have required an increased output of albumin of 10 per cent. The net increase in total circulating protein over the estimated pre-pregnancy amount is between 25 and 30 per cent.

Albumin is needed during pregnancy to build new tissue for the placenta and the fetus, and it must be withdrawn from circulation in considerable amounts. Therefore, the actual increase in production of albumin is presumably greater than the 10 per cent estimated for the maintenance of the observed serum concentration. The demand for total protein levels that will maintain a satisfactory physicochemical balance apparently is met by a marked increase in globulin. A recent experiment by Miller (3) on dogs using tagged DL-Lysine showed that plasma globulin was synthesized more rapidly than albumin. Under the stress of pregnancy a rapid synthesis of globulin seems to be stimulated.

It is obvious that the decrease in albumin and increase in globulin results in a gradual but constant reduction in the albumin-globulin ratio. A low A/G ratio is sometimes considered indicative of protein deficiency, but in pregnancy a very low ratio cannot be interpreted as indicative of a protein

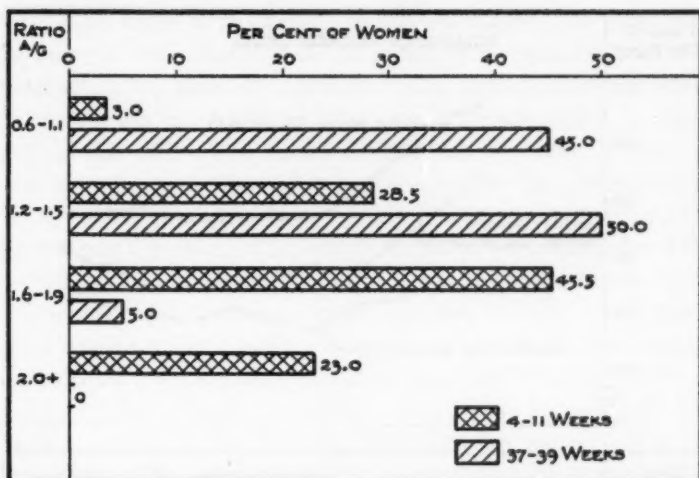


Fig. 6. Per cent of prenatal patients with the specified albumin-globulin ratio early in pregnancy and in the last three weeks.

deficiency. In the first trimester the A/G ratio averaged 1.7 and declined steadily to 1.2 in the last six weeks. This shift was characteristic of nearly all women. In Figure 6 the percentages of women for whom different A/G ratios were obtained on examination before the 12th week of gestation and in the last three weeks are shown. Early in pregnancy, 68 per cent of the cases had a ratio of 1.6 or higher, but at the end of pregnancy only 5 per cent had a ratio as high as 1.6. A low ratio late in pregnancy may be a favorable finding since it is associated with an accelerated production of globulin.

These average trends in blood values for all women give us a standard or level of reference against which to measure changes that may occur for women having various specific characteristics. One characteristic that differentiates the women and may be expected to affect the trends in blood levels as pregnancy progresses is their initial or early pregnancy blood levels.

In Figure 7 the change in hematocrit values and in hemoglobin is shown for three groups of women. The grouping was

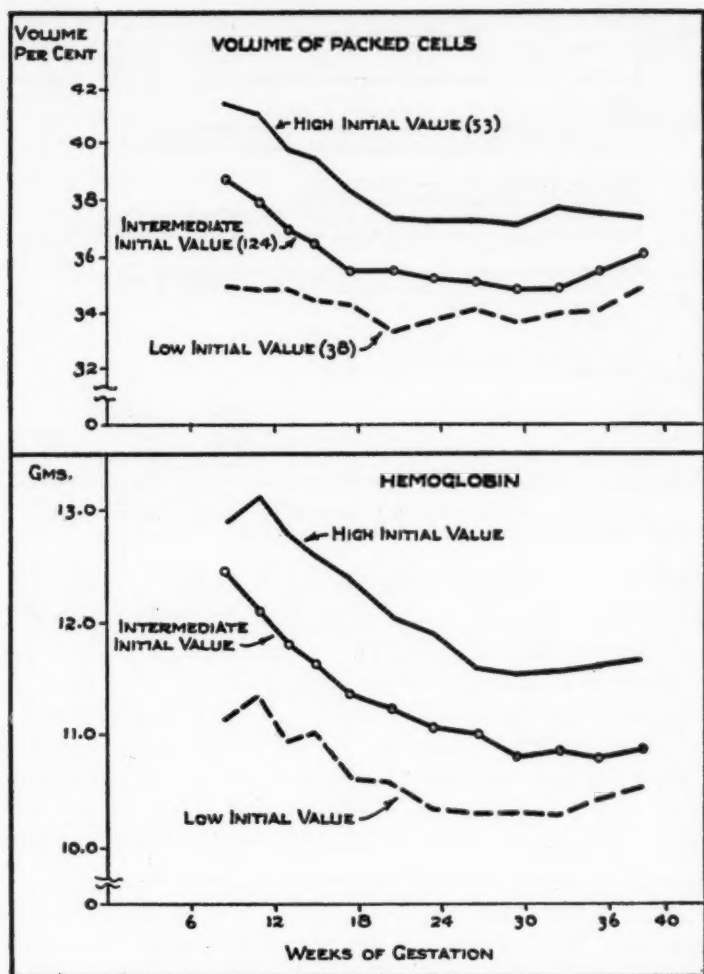


Fig. 7. Change in average hematocrit and in average hemoglobin values during pregnancy for three groups of women classified according to their hematocrit value at their first visit to the Nutrition Research Clinic, Pennsylvania Hospital.

made on the basis of the first hematocrit reading, and Group I includes those with relatively high volume of red cells, Group

II includes those with reading in approximately the middle 60 per cent of the distribution of readings at specific weeks of gestation, and Group III includes those with hematocrit readings below the lower limit of the middle 60 per cent.<sup>8</sup> In addition to the 161 white patients used for the total curve, 54 colored patients are included in averages for the three groups.

For the women with high and with average initial hematocrit values, the average curves throughout pregnancy for both the volume of packed red cells and for hemoglobin are quite similar and resemble the average curves for the total group which have been discussed. The group with low initial hematocrit values shows less decrease than the other two groups, especially for the volume of packed cells. The variation in the average volume of red cells during pregnancy for Group III is very slight; the minimum value is at about 20 weeks and is only 5 per cent less than the earliest value for the group, then the curve rises steadily after this point to a level about equal to the earliest value.

A similar comparison of three groups of women classified according to their initial total serum protein values is shown in Figure 8 for total protein, for serum albumin, and serum globulin. Again, the striking difference in these three groups is the small decrease in total serum protein during pregnancy for women with low initial levels compared with the decrease in the other two groups. The averages for serum albumin levels decrease for all three groups up to the last six weeks of pregnancy; but the drop in levels is greater the higher the initial level during the first half of pregnancy, and in the latter half there is no significant difference in the average albumin levels for the three groups, although the albumin level for the low group has some tendency to decrease more than the other

<sup>8</sup> Since the first visit to the prenatal clinic varied from the 6th to the 15th week of gestation, and the average hematocrit value decreased sharply during this period, hematocrit readings used as limits for the three groups were shifted for different periods of gestation. From distributions of hematocrit readings at less than 10 weeks, at 10-12 weeks, and at 13-15 weeks, upper and lower limits for the middle 60 per cent were obtained; and cases were classified as within, above, or below these limits. The average hemoglobin curves are for the women classified according to their hematocrit readings.

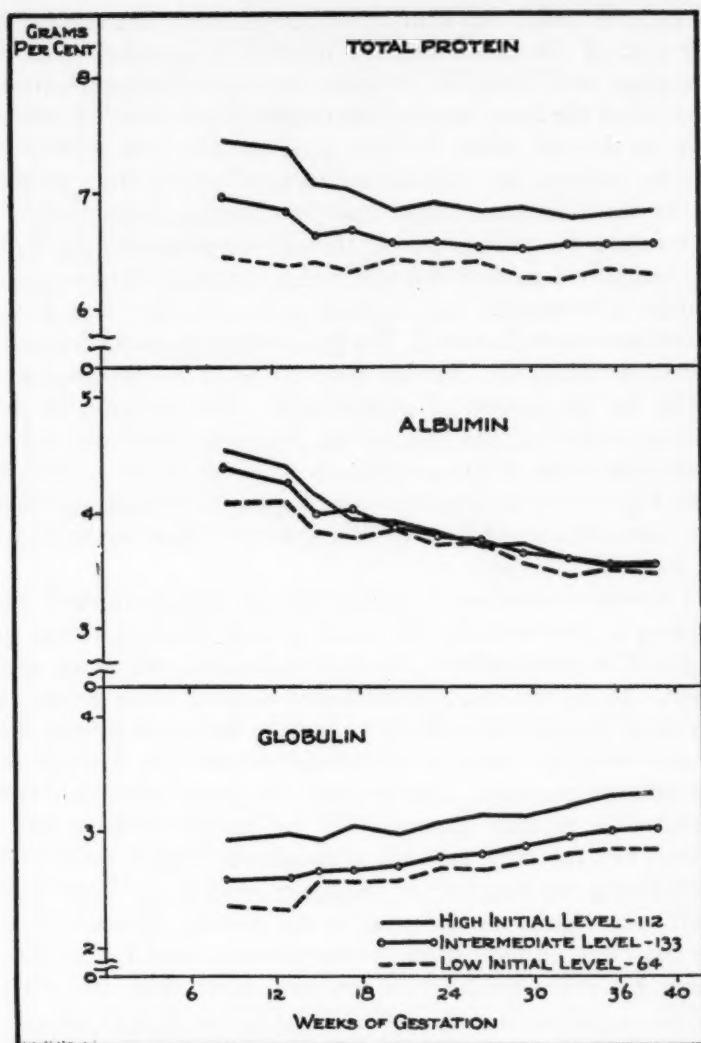


Fig. 8. Change in average total serum protein, in average albumin, and in average globulin during pregnancy for three groups of women classified according to their total serum protein value at first visit to the Nutrition Research Clinic, Pennsylvania Hospital.

groups in the early part of the third trimester. The maximum decrease in the average curves for albumin is 0.99 gm. for the high initial level group, is slightly less for the intermediate

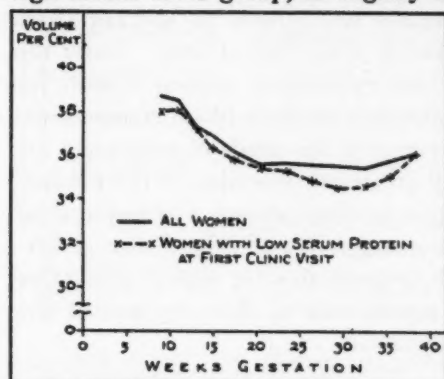


Fig. 9. Change in average hematocrit value during pregnancy for women having a low total serum protein at first observation compared with average change in hematocrit for all women.

group (.83 gm.), and least for the low initial level group (.62 gm.), and the percentage decrease varies in the same order. All groups have an increase in serum globulin and it is the difference in globulin levels which maintains a difference in total serum protein levels for the groups throughout pregnancy. However, the increase

in globulin varies inversely with the initial level of the groups and the maximum increases were .39 gm., .43 gm., and .50 gm., respectively. Thus, the increase in globulin for the low protein group was nearly equal to the decrease in albumin. The question arises whether the smaller decrease in blood levels for women with low initial values is associated with a relatively small increase in plasma volume. No direct evidence is available, but some evidence on this point may be obtained from the change in hematocrit values for the women included in the group with low initial protein values. In Figure 9 the average hematocrit curve during pregnancy for the 64 women with low initial protein findings is compared with the hematocrit curve for the total group. The low protein group has slightly lower average volume of red cells but the decrease in hematocrit during pregnancy is also slightly greater than for the total group. Thus, there is no indication that these women did not experience an increase in plasma volume equally as large on the average as other women.

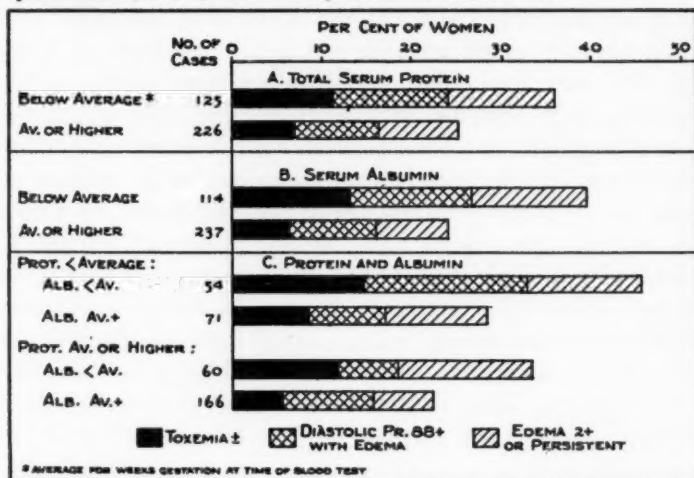


From the trends in red cell volume, in hemoglobin, and in serum protein and albumin shown by the curves for these different groups of women, it seems reasonable to conclude that a protective mechanism operates which tries to prevent these blood values from falling below some critical level. Under the stress of pregnancy there are apparently certain stimuli for the production of greater amounts of these blood constituents. In general, this is to be expected if the needs of pregnancy are to be met. But a relatively greater acceleration in the production of red cells and of protein by those women who began their pregnancy with blood values suggestive of a borderline deficiency indicates a remarkable response to some type of protective stimuli. The nature and significance of this response to the stress of pregnancy is not apparent.

#### PROTEIN LEVELS AND SYMPTOMS OF TOXEMIA

As a clinical problem, the important question is whether serum protein levels have any relation to complications of

Fig. 10. Frequency of symptoms associated with toxemia of pregnancy among 351 women classified: A, according to total serum protein level at first visit; B, according to serum albumin level at first visit; and C, according to protein level (as in A) subdivided by albumin level (as in B).



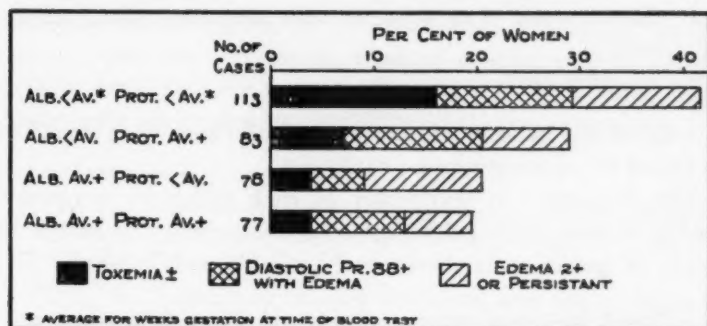


Fig. 11. Frequency of symptoms associated with toxemia of pregnancy among 351 women classified in four groups, two groups on basis of lowest serum albumin value relative to average level at a given period of pregnancy and each albumin group subdivided according to total serum protein value.

pregnancy. For 351 women supervised by the Nutrition Research Clinic,<sup>9</sup> the incidence of toxemia and of symptoms common to toxemia among women having different protein levels has been studied.

It is necessary to describe the symptoms and conditions which have been included in the incidence rates shown in Figures 10 and 11. There were only six cases diagnosed on the hospital charts as pre-eclampsia or eclampsia—too few for any statistical analysis. The prenatal histories of the 351 patients were reviewed and, on the basis of recorded symptoms, patients were classified in one of four categories as follows:

1. Toxemia, plus-minus:
  - a. Pre-eclampsia or eclampsia.
  - b. Hospitalized for control of excessive weight gain and/or other symptoms suggestive of potential toxemia.
  - c. Blood pressure 140/90 one or more times with edema.
2. Elevated diastolic blood pressure (88 or higher) and edema at any time during pregnancy.

<sup>9</sup> These were all of the patients delivered up to September, 1949 for whom two or more total serum protein and albumin determinations were available, one of which was before 19 weeks of gestation, except for exclusion of the following: 3 cases of syphilis and 1 of gonorrhea; 2 cases of essential hypertension and 1 of chronic nephritis and hypertension; and 1 case of chronic pyelo-cystitis.

3. Edema rated ++ or worse or very persistent edema rated only +.
4. All other cases.

A total of 102 patients, 29 per cent of all cases, were classified in one of the three symptom categories.

The frequency of occurrence of each group of symptoms among women having different serum protein levels before 18 weeks of gestation is shown in Figure 10 and Table 1. The

Table 1. Incidence of symptoms associated with toxemia during pregnancy among women with average<sup>1</sup> and higher or below average serum protein and albumin levels early in pregnancy.

CLASSIFICATION OF WOMEN BY TOTAL SERUM PROTEIN AND ALBUMIN LEVELS AT FIRST BLOOD EXAMINATION (6-18 WEEKS GESTATION)	NUMBER OF WOMEN	PER CENT OF WOMEN WITH SPECIFIED CONDITION <sup>2</sup>				
		Total	Toxemia + or -	Elevated Diastole (88+) and Edema	Edema 2 + or Persistent	Total of Three Symptom Groups
TOTAL WOMEN	351	100.0	8.5	10.5	10.0	29.0
A. Total Serum Protein:						
Below Average	125	100.0	11.2	12.8	12.0	36.0
Average or Higher	226	100.0	7.1	9.3	8.8	25.2
B. Serum Albumin:						
Below Average	114	100.0	13.2	12.3	14.0	39.5
Average or Higher	237	100.0	6.3	9.7	8.0	24.0
C. Protein and Albumin:						
Protein Below						
Average						
Albumin Below						
Average	54	100.0	14.8	18.5	13.0	46.3
Albumin Average +	71	100.0	8.5	8.5	11.3	28.2
Protein Average or						
Higher						
Albumin Below						
Average	60	100.0	11.7	6.7	15.0	33.3
Albumin Average +	166	100.0	5.4	10.2	6.6	22.3

<sup>1</sup> Average used for classifying an individual is always that for total serum protein and for albumin based on all determinations made at the same period of pregnancy as that at which the individual's first protein determinations were made.

<sup>2</sup> See text, page 253.

classification of women by protein levels was based on the *average* level for the specific week of gestation at which the protein determination for an individual had been made. Incidence rates are shown for the following groups of women:

1. Total serum protein:
  - a. Women with protein level equal to or above average.
  - b. Women with protein level below average.
2. Serum albumin:
  - a. Women with albumin level equal to or above average.
  - b. Women with albumin level below average.

A further subdivision of the women into four groups was made by subdividing each of the two total protein groups according to their serum albumin levels as in 2-a and 2-b above.<sup>10</sup>

The incidence rate (per cent of women affected) for each of the three symptom groups was higher for women with an initial total protein level below average than for those with an initial value equal to or above average. The differences for the separate groups of symptoms are not statistically significant, but the difference in rates for all symptoms combined is significant ( $P .01-.05$ ).

When the incidence rates for women with different albumin levels, regardless of total protein, are compared, the rates for each group of symptoms are higher among women with below-average initial albumin levels. The difference for toxemia  $\pm$  is larger than when total protein groups were compared and is statistically significant ( $P .01-.05$ ). The differences for other separate symptom groups are not significant statistically, but the difference for all symptoms is significant ( $P < .01$ ).

The incidence rates obtained when women are classified by both protein and albumin show greater differences, but the

<sup>10</sup> Classification by total serum protein and albumin is equivalent in the majority of cases to making a two-fold subdivision of the two albumin groups by globulin levels below average and equal to or above average. However, there are some exceptions which may be significant. For example, if the albumin level is much below average, the globulin level may be average or higher without bringing the total protein to the average level, and, also, if the albumin level is high, the total protein level may be above average although the globulin level is below average.

numbers of women in the separate protein-albumin groups are small and the pattern of difference is not constant for the three symptom classes. Toxemia  $\pm$  occurred in 15 per cent of the women with below-average initial protein and below-average albumin as against a rate of 5 per cent in those with average or higher values for both protein and albumin. This difference is statistically significant ( $P .01-.05$ ). Other differences for individual symptom groups are not significant. When all symptoms are combined there is a regular progression in frequency with the highest rate for those with low albumin and low total protein, the next highest for women with low albumin but average or higher total protein, and the lowest rate for women with average or higher albumin and average or higher total protein. The difference between the highest and lowest rate is very significant ( $P < .001$ ).

From the previous discussion of the striking decrease in average albumin levels throughout pregnancy, even for women with relatively high initial levels, it is to be expected that some of the women who had average or better protein values early in pregnancy would have less than average values late in pregnancy. The incidence of symptoms associated with toxemia, therefore, was examined for women who maintained average or better levels and for those who failed to maintain average levels.<sup>11</sup> For this purpose, women were classified in one of the four protein-albumin groups on the basis of their lowest protein and albumin levels<sup>12</sup> relative to the average observed at any time in pregnancy.

The large number of women who failed to maintain average protein and albumin levels is shown by comparison of the numbers of women in the four protein-albumin groups in Table 2 and in Table 1. Thus, only 54 women (15 per cent of the total)

<sup>11</sup> Only one protein determination in the latter half of pregnancy was available for about 30 per cent of these women; therefore, the record of failure to maintain average levels was by no means complete.

<sup>12</sup> The few cases for which the lowest total protein level and lowest albumin level were not obtained at the same examination were classified according to the test with the lowest albumin rating. For example, a case with less than average total protein—above average albumin at one test and above average protein—less than average albumin at another test would be put in the latter group.

had protein and albumin levels below average early in pregnancy, but 113 women (32 per cent) had these low levels at some time. Similarly, 166 women had total protein and albumin values equal to or higher than the average values at their first examination, but only 77 remained in this category throughout pregnancy.

Incidence rates for symptoms associated with toxemia are compared in Figure 11, for women classified into four groups on the basis of the lowest protein-albumin level observed at any time during pregnancy. The pattern of differences among the groups becomes more definite when the protein levels throughout pregnancy are considered.

The differences in frequency of cases of toxemia  $\pm$  for the four groups are of special interest since these include the cases showing the most advanced symptoms. When albumin was

Table 2. Incidence of symptoms associated with toxemia of pregnancy among women classified according to lowest albumin level and total protein observed at any time during pregnancy.

CLASSIFICATION OF WOMEN BY LOWEST ALBUMIN LEVEL AND ASSOCIATED TOTAL PRO- TEIN DURING PREGNANCY <sup>2</sup>	NUMBER OF WOMEN	PER CENT OF WOMEN WITH SPECIFIED CONDITION <sup>1</sup>				
		Total	Toxemia + or -	Elevated Diastole (88+) and Edema	Edema 2+ or Persistent	Total of Three Symptom Groups
TOTAL WOMEN	351	100.0	8.5	10.5	10.0	29.0
<i>Albumin Below Average:</i>						
Protein Below Average	113	100.0	15.9	13.3	12.4	41.6
Protein Average or Higher	83	100.0	7.2	13.3	8.4	28.9
<i>Albumin Average or   Higher:</i>						
Protein Below Average	78	100.0	3.8	5.1	11.5	20.5
Protein Average or Higher	77	100.0	3.9	9.1	6.5	19.5

<sup>1</sup> See text, page 253.

<sup>2</sup> Classification is made in relation to average albumin and average total serum protein values at specific weeks of gestation. Each woman had at least 2 protein determinations, one before 19 weeks of gestation and one after 23 weeks; 70 per cent of the women had 2 or more determinations after 23 weeks.



equal to or above average at every examination, the incidence of toxemia  $\pm$  was the same (3.8 and 3.9 per cent) for the women with below-average protein and for those with higher total protein. This incidence is about one-fourth of the incidence among women with below-average albumin *and* below-average total protein. The difference is very significant statistically ( $P < .01$ ). When albumin levels dropped below average but total protein remained at the average level or higher, the incidence of toxemia  $\pm$  was less than one-half that for the women with low albumin and low protein. Although this difference is not statistically significant ( $P .05-.10$ ), it strongly suggests a protective effect of a high globulin level when the albumin level falls.

Variation in rates for cases of elevated diastolic blood pressure with edema and for cases of marked edema alone was not as great among the different protein-albumin groups as that shown by toxemia. None of the differences among groups are statistically significant. There is a tendency for these symptoms to occur less frequently if the albumin level remained high.

In summary, it may be concluded that there was a very definite relationship between the albumin level during pregnancy and the occurrence of symptoms associated with toxemia. Among those women who maintained an average or higher albumin value, regardless of whether the total serum protein remained high, the incidence of these symptoms, especially the more advanced toxemia  $\pm$ , was lower than among women with below-average albumin. Higher amounts of globulin (total serum protein) had no effect on the incidence rates when albumin was at a high level. However, if the albumin value dropped below the average level, the occurrence of symptoms was less frequent when the globulin level increased sufficiently to keep the total serum protein at the average or higher level than when the total protein also was below average. Furthermore, it may be noted that not only those women who had low albumin values early in pregnancy had a relatively high incidence of symptoms, but also those who initially had high values and



later dropped below average had a similar high incidence of symptoms. There were many cases of the latter type.

This relationship between serum protein and toxemia symptoms can not be interpreted as demonstrating a deficiency of protein intake as a factor in the incidence of symptoms, since factors other than intake may have affected the serum levels. One phase of the study now in progress at the Philadelphia Lying-In Hospital is to investigate the effect of an increased protein intake on serum protein levels and on the incidence of symptoms.

Individual changes in serum protein and in albumin during pregnancy show many variations from the average trends that have been presented. There are several patterns of change which are fairly characteristic of the changes observed for many of the women and which were associated with the symptoms that have been considered. It may be of interest to discuss several case histories which demonstrate some typical changes in protein and the associated symptom response.

First, there are the patients for whom changes in blood levels followed the general trend. In Figure 12, the record of case number 437 is of this type although the albumin level is below average throughout pregnancy. The albumin level decreases greatly from the 15th to the 21st week of gestation, it then stabilizes and declines only slightly at the middle of the third trimester. Total serum protein is above the average initially, decreases into the second trimester but remains at about the average protein level. During the second trimester, this patient had excess weight gain and a blood pressure of 130/88 at one visit. She was apparently in a marginal status but was classified as not having toxemia symptoms since the elevated blood pressure was not accompanied by a recognized edema.

Case 389, in Figure 12, is one of the group with relatively high albumin and high protein who developed a borderline toxemia and was sent into the hospital for control in the last week. Albumin levels declined at less than the average rate, and protein showed no decline until the 36th week when the

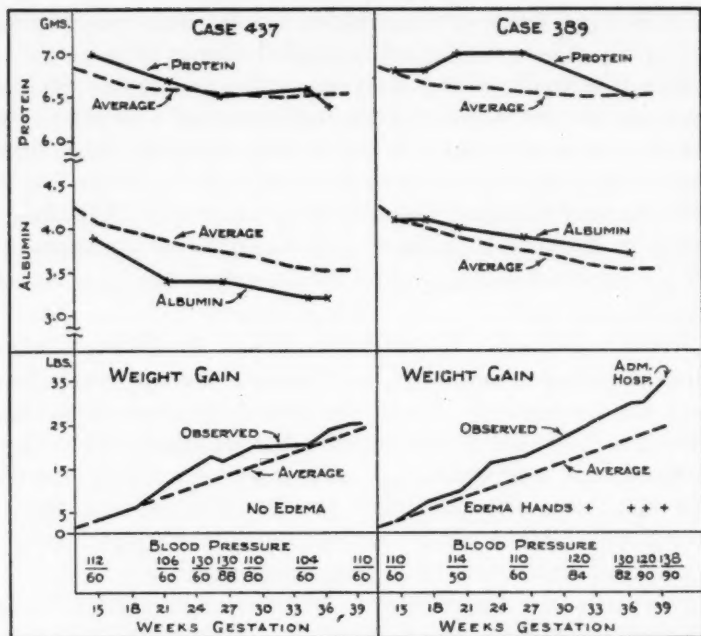


Fig. 12. Serum protein values, serum albumin values, weight gain, blood pressure, and edema observed during pregnancy for two individual patients.

value had dropped 0.5 gm. but was still average. There was no determination of serum protein between the 26th and 36th week, but two hematological readings were made and these showed a sharp decrease and it is very probable that protein also decreased early in the third trimester. A marked decrease in the middle of the third trimester is not uncommon and is often associated with appearance of some symptoms.

In Figure 13, two case histories are shown which are typical of changes in protein levels in many patients. A decrease occurs in the second trimester and is followed by some increase or no further decrease for several weeks, but a second drop occurs in the latter part of the third trimester. Thus there appear to be two periods of stress, at both of which some clinical signs may become evident.

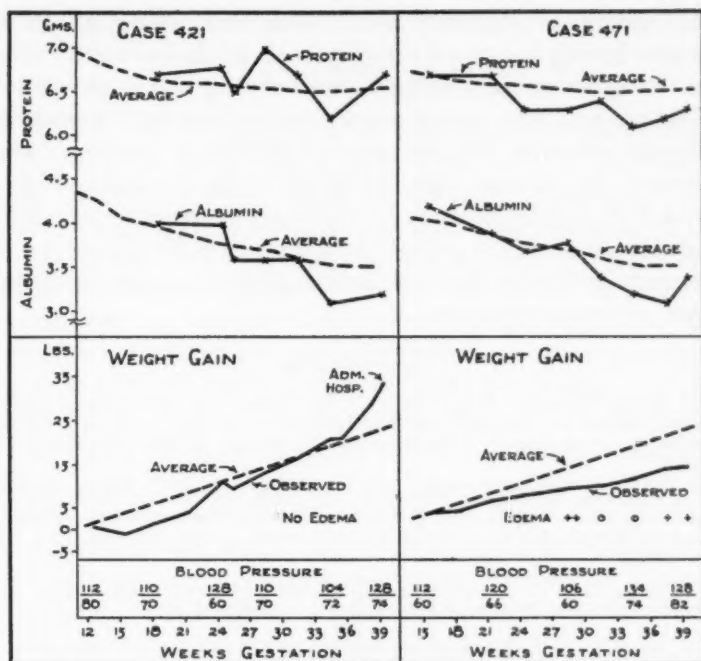


Fig. 13. Serum protein values, serum albumin values, weight gain, blood pressure, and edema observed during pregnancy for two individual patients.

### SUMMARY

Blood values for the volume of red blood cells (hematocrit), for hemoglobin, for total protein, and for albumin decreased markedly during the first half of pregnancy for a large group of women. The average decrease was approximately equal to that expected as a result of average increase in plasma volume. In the second half of pregnancy, although plasma volume continues to increase, both the hematological values and total protein and albumin values show only a slight further decrease. Globulin increased during the second and third trimesters. These data indicate a greatly increased production of these blood constituents.

The incidence of selected symptoms commonly associated

with toxemia of pregnancy was found to be much higher among women having both total serum protein levels and serum albumin levels below the average values for the group at any period of pregnancy than among women with either total protein or albumin values at the average or higher level. Incidence was lowest if the albumin value remained at the average or higher level, but a globulin value high enough to maintain the total serum protein at the average or higher level in spite of a low albumin level afforded considerable protection against occurrence of these symptoms.

#### REFERENCES

1. Caton, William L.; Roby, Charles C.; Reid, Duncan E.; and Gibson, John G.: Plasma Volume and Extravascular Fluid Volume During Pregnancy and the Puerperium. *American Journal of Obstetrics and Gynecology*, March, 1949, Vol. 57, 3, p. 471.
2. Thompson, K. Jefferson; Hirsheimer, A.; Gibson, John G.; and Evans, William A.: Studies on the Circulation in Pregnancy. III. Blood Volume Changes in Normal Pregnant Women. *American Journal of Obstetrics and Gynecology*, July, 1938, Vol. 36, 1, p. 48.
3. Miller, Leon L.: Production and Utilization of Plasma Proteins Studied with Radioactive Lysine (Abstract). *Science*, October 28, 1949, p. 441.

## THE UNITED STATES "POINT FOUR" PROGRAM\*

SAMUEL P. HAYES, JR.<sup>1</sup>

THE President's proposal for a "bold new program" of aid to the underdeveloped areas of the world, announced in his inaugural address of January, 1949, aroused tremendous interest both at home and abroad. The reactions of listeners ranged from those who saw in it a solution to particular problems, such as support of the natural rubber industry to enable rubber producing countries to purchase their own development, to the most imaginative and far reaching proposals for expanding and integrating the economic programs of the United States into a single program capable of solving the "dollar gap," relieving pressures of overpopulation, stabilizing the business cycle, disposing of surplus commodities, and replacing the European Recovery Program. A great many kinds of suggestions and advice came from people with experience in this field, including scientists, educators, economists, business men, cultural anthropologists, and missionaries. These suggestions and this advice were combined with the information and experience already obtained by government agencies to form the projected Point Four program.

The Congress was asked by the President to consider two pieces of legislation to implement the President's Point Four proposal. The "Act for International Development," approved by the Congress in May, 1950, provides authority to finance, carry out, and coordinate a wide variety of international technical cooperation activities. Among these are the sending of technical experts to advise foreign government agencies, private organizations, or business enterprises, and to take part in operating many kinds of activities—for example, research and experiment stations, public health or education services, rural

\* This paper has been revised to take into account developments since November 16, 1949, when the paper was presented before the Round Table on Modernization Programs in Relation to Human Resources and Population Problems, held in connection with the 1949 Annual Conference of the Milbank Memorial Fund.

<sup>1</sup> Special Assistant to the Assistant Secretary for Economic Affairs, Department of State.

extension services, projects for irrigation, reclamation, reforestation and so on. A very effective instrument of technical interchange thus authorized is the *servicio*, in which transmitting and receiving countries jointly finance and administer projects in various fields. Here, the receiving country gradually assumes the cost of the project, which eventually becomes an integral part of the local governmental structure. Other methods authorized include the exchange of teachers, students, and specialists; the establishment of technical libraries and film services; international seminars and conferences; and the translation and distribution of technical publications.

Both governmental agencies and private commercial and non-profit groups in this country have had considerable experience, particularly in Latin America, in teaching technical know-how. The agencies of the United Nations and of the Organization of American States have also done substantial work in this field. The proposed technical cooperation program will build upon this experience in a greatly expanded program, mainly carried out by financing increased operations by the private and public agencies that are already active.

The second bill proposed to carry out Point Four, but not yet enacted by the Congress, would authorize an experimental program of investment guarantees intended to encourage the flow of private investment capital to underdeveloped areas. Private savings constitute in this country the major source of year-in, year-out investment, now running at an annual rate of about \$35 billions. This provides a far greater potential source of capital for investment abroad than the amounts of public investment capital likely to be available in a predominantly private enterprise economy like that of the United States. Also, in private equity capital there is available an agent that is particularly effective in bringing about economic development abroad, because this is active, not passive, capital; it carries along with it the technical, managerial, and organizational talents needed to put the funds invested to most effective use.

The guarantees contemplated in the proposed legislation

would protect the investor (for a fee) against such non-business risks as confiscation of his property without fair compensation, and inability to convert into dollars a specified amount of foreign currencies derived in the form of earnings, capital liquidation, and so on. There would not, of course, be any guarantee that an investor would make a profit.

These guarantees would supplement the bilateral commercial treaties, now under negotiation with many countries, which are designed to assure fair treatment of the investor as well as of local interests.

It is hoped that such guarantees and treaties will succeed in stimulating a substantial flow of private American investment capital to the underdeveloped areas.

The term "Point Four program" is appropriately applied only to the United States program, of course. The United Nations and its specialized agencies were carrying on technical assistance programs before the President made his speech and are planning to carry on very large programs in the future. Although the great expansion of these programs came about as a result of the President's speech, and although they will draw substantial support from the Point Four funds of the United States, they are international programs in which the United States is simply one participant. These international programs face problems similar to those which the Point Four program faces, and much of the following discussion will be pertinent to them, but it will not touch on the United Nations programs except in terms of their relationship to ours.

It is probably not appropriate at this time to undertake an extended discussion of the general objectives of the Point Four program or its relationship to other American foreign policies and programs. These are pretty generally understood. Suffice it to say that the Point Four program is a part of our foreign policy. It helps to achieve, and it is intended to help achieve, the same objectives that our foreign policy in general is attempting to achieve—to create a world in which all peoples may find peace and security, broader freedom for the individual,



and greater economic well being. This program derives its justification from the contribution it makes to achieving those general objectives.

When the President spoke, he did not present a fully elaborated program of action. As General Marshall had done in 1947, when he announced the basic principle of our readiness to cooperate with European countries in an economic recovery program, the President simply stated a general principle of foreign policy, a principle that would modify existing policies and programs and that would require the development of a detailed action program to carry out the full promise of the proposal. Point Four has, in fact, already had an effect in terms of a reorientation of our existing economic programs, including economic recovery programs, governmental loan activities, the reciprocal trade program, and our existing technical assistance activities. All now give increased importance to the needs of the economically underdeveloped areas of the world.

Essentially, Point Four means a new emphasis in our foreign policy. It is not a departure from previous policy, but it is a development of it. It raises to a new level—both in importance and in range of activities—the kinds of programs already being carried on in this field. It also means their coordination, for, particularly in the first few years, we may get more out of tying together the current and the incipient new activities than we may be able to get in the way of entirely new activities.

First, there is the problem of coordinating different kinds of technical assistance activities. Health and agriculture and educational programs should be run so that they support each other, mutually complement each other.

Second, there is the need for coordination between technical and financial programs. If a loan is being considered for a particular project, consideration should be given to providing technical assistance that will reinforce and make that loan more effective.

Thirdly, there is need for coordination between government

and private activities. Many private religious groups, philanthropic foundations, and educational organizations, as well as business enterprises, carry on extensive operations abroad. Much can be gained by bringing these private profit and non-profit activities together with the governmental activities which are being carried on under this proposed program.

Finally, there is the need for coordination between the United States bilateral programs—which are expected to continue and to expand—with the various multilateral programs. The latter include, not only the programs of the United Nations and its specialized agencies but also, programs carried on or planned by the Organization of American States and its specialized agencies, by the South Pacific Commission, and by the Caribbean Commission. Coordination is going to be one of the real administrative headaches throughout this whole program.

Obviously, the underdeveloped countries themselves have a major job of coordination within their individual countries. If four or five different agencies—all competent as far as legislation and financing are concerned—work in a single country (as is already the case in some Latin American countries) there may be difficulty in coordination. It may be desirable for these governments to develop special mechanisms for keeping the various activities going in such a way that they pull together instead of apart. That is a primary place where this coordination can be effectively brought about.

In the substantial experience with technical cooperation programs that we have already gained, primarily in Latin America, certain general principles have emerged which we feel are very important in planning ahead to a much expanded program. Most of these are pretty familiar to you, so I will mention them only briefly, in the expectation that discussion can develop the details of particular interest.

First, Point Four is basically a program of stimulating and aiding economic development by building up productive resources and improving methods of production. It involves the application of two vital forces—modern technology and capital

—to the existing manpower and natural resources of the have-not areas. In agriculture, health, education, and public administration important improvements can be made without requiring much in the way of capital investment, especially from abroad. Better techniques such as contour plowing, malaria control, seed selection, and repair and maintenance of simple machinery can be very effective quite soon in these fields. Of course, capital becomes the main item in developing power, communications, railroads, factories, and so on.

Second, it is quite clear that economic development must be based on the needs and on the desires of the people who are affected by that development. We know a good deal already about the desires of other countries for particular kinds of economic development. Beyond that, however, it is frequently necessary to sit down with the officials of other governments who have the imagination and intellectual competence and background to see what development possibilities exist in their countries. This is not at all a one-way process. It is likely to be a complicated interaction in which there is mutual suggestion and mutual development of the kinds of things that need to be done and are possible, the kinds of things that are suitable, the kinds that would be desired if they had been proposed and generally discussed, and so on.

Third, there is only a very limited amount that can be done to aid development by agents or aid from outside the country itself. For example, the amount of new capital inflow that can be absorbed without inflationary effects is limited, particularly in the really underdeveloped areas. Moreover, the amount of foreign investment that any country can service without excessive drain on its foreign exchange earnings is likewise limited. The major share of the capital needed for economic development must in every country come from the savings accumulated by the people living in that country. On the technical assistance side, similarly, foreign advisers and foreign technicians or managers who help organize and run local operations can be of great assistance, but only where the people and the government

of the country really want to move ahead. Economic development does not have a firm base unless it rests upon the initiative and the personnel of the area concerned. The foreign advice and example must take root in the attitudes and skills of local people. Point Four can expedite and catalyze the process of development, but no development can succeed that does not draw its main impetus from within an economy.

Fourth, economic development must be based directly on the existing resources of the country, its people, its natural resources, its accumulated capital. Resources, of course, do not mean anything except in terms of comparative costs and comparative advantages, the possibilities of competing when selling in a large market, and so on. It is not a matter of developing self-sufficient economies but self-supporting economies, which is quite a different thing.

This general conception of development within a world market is not very well understood. The first objective of many countries is a steel industry. There may not be adequate resources or potential markets large enough to support a mass production industry, but a steel industry is wanted primarily on the grounds that it is a symbol of prestige, a symbol of high development. Bringing a realistic attitude into being in many areas may well be the first requisite for economic development that really makes its greatest contribution to the material conditions of the people involved. Building a steel industry may mean getting along with a much lower standard of living than would be possible if the same resources were devoted to other kinds of production.

This leads us to the fifth point, that the kinds of production aided by the Point Four program during its first years will be determined by the possibilities and needs of the underdeveloped countries, and will therefore stress agricultural development. These countries also have needs for basic public services, such as transportation (but probably gravel roads rather than airplanes), improved communications (but probably rural postal delivery service rather than telecommunications), reliable and

safe water supplies, and power (from modest hydro-electric installations), and these may be aided by technical advice and planning, and may be financed where appropriate by inter-governmental loans. It does not look, however, as though a major share of the Point Four effort would go into modern manufacturing technology or even highly mechanized farming. This is not, of course, a policy imposed by the United States. It is a prediction of the form of the needs that will be expressed by the governments of the underdeveloped countries.

All of these factors help bring about the sixth characteristic of the program, that it must be a long-term program which is not oversold in terms of immediate and dramatic results but which is undertaken with the intention of following through over many years. Before capital and modern technology can be fully utilized in an underdeveloped area, there is usually a lot of groundwork to be done. The people in that area must be ready to receive technical knowledge and to make efficient use of capital, and the early stages of economic development in many areas must therefore be concerned with improvements in basic education, health and sanitation, and food supply. Certain services must also be expanded and improved, such services as water control and supply, transportation and communication, and power. Governmental administration may have to be strengthened. Local governments may have to adopt efficient and fair fiscal and business practices in order to encourage the flow of investment from foreign and local sources of wealth.

Beyond these factors, the speed of development may be limited by existing attitudes and social organization; by the extent to which they can be modified in order to bring about improved production methods; and by the rate at which private capital can be accumulated to take its part in development. These processes take time—lots of it. But though they must start slowly, there is no known limit on the extent of improvement that they may eventually bring about.

Seventh, this program must by its nature be international in scope. No one country could possibly carry single-handed the

effort necessary to speed up the development of two-thirds of the world's people. That is a major world problem, and it will require the best efforts of all nations which can contribute to it. Point Four is therefore intended to stimulate a world-wide program of cooperative aid to economic development.

I am sure you are all aware of the vigor and enthusiasm with which the United Nations and its specialized agencies have been attacking this problem. These various agencies already have in operation substantial programs of technical assistance, financed out of their regular budgets. The General Assembly has unanimously approved a greatly expanded program, to be financed by voluntary contributions from member states. It is our intention, if Congress approves, to contribute some \$12 millions to this expanded program. Forty-nine other nations have already announced their intention of contributing also, bringing the total pledges (much in foreign currencies) to the equivalent of more than \$20 millions.

Eighth, this is not solely or even predominantly a governmental program. True, governments will provide funds for a great expansion in international technical cooperation. But much of those funds will be spent through private agencies, under special contracts. Private agencies will be assisted in carrying out their own activities, and their advice will be sought on government plans. On the capital investment side also, a great emphasis will be placed on private enterprise, with government as facilitator and cooperator.

Consistent with the long-range, gradual, substantially private character of the program is its ninth major aspect. So far as United States Government assistance is concerned, this is to be a relatively low-cost program. On the technical cooperation side, it is estimated that not more than 85 million dollars (in all currencies) could be effectively spent during the first year, counting the contributions of all participating nations and the related expenditures of receiving countries. The Congress has authorized the appropriation of \$35 million for expenditure during the first year of the program.



Finally, this is proposed as a program that will develop and change its character as time brings new needs and new possibilities for aiding economic development abroad. There may well be additional legislation requested. This is an experimental approach, a pragmatic approach. We do not know enough about the whole development process to lay out in advance what can be done. We are going to ask for authority as we go along and as it seems that we can use additional kinds of authority.

I think that is, perhaps, all I should say before we get into the discussion. I do want to emphasize that we are looking forward to ideas and we are looking for all kinds of suggestions. We are honest when we say this is an experimental program. We are getting into deep water here, and we need all the help we can get from sociologists, anthropologists, or economists, or anybody else who has good ideas and who can tell us how to do a better job.

We have not yet set up our administration. We can establish new principles of administration under the very broad authorities we have. We can go to Congress and get new authorities. We can do anything that seems necessary to do a good job in order to carry out this basic principle and serve this major objective of our foreign policy, to aid the economic development of the underdeveloped areas of the world.



## POPULATION INCREASE AND MANPOWER UTILIZATION IN IMPERIAL JAPAN

IRENE B. TAEUBER<sup>1</sup>

THREE centuries ago the population problems of Asian lands were relatively simple. Asia then included only one-third the number of people who now secure a limited subsistence from its crowded rice lands, its dry plains and its eroded hills. As elements of the culture of the West expanded eastward, the stability and order of centralized governments and controlled economies replaced the civil strife and the hazardous inefficiencies of self-sufficient groupings. Export crops were introduced, subsistence increased and the force of epidemics limited. Mortality declined, but as the life in the peasant villages proceeded in the routine of the centuries the number of children born was not decreased proportionately. The population increase thus generated was long accepted as evidence of the beneficent influence of imported governments and technologies in the East.

As numbers became super-abundant, governments sought solutions through extending irrigation projects, improving agricultural techniques and redistributing people. There was a general lack of awareness of the elementary fact that population cannot increase indefinitely within a finite area, no matter how expansible the resources. It was more comfortable to evade than to wrestle with the fundamental contradictions of an expanding technological culture whose ultimate welfare problems increased in approximate ratio to its economic efficiency and its humanitarianism. Yet analysis of the historical developments in area after area reveals these contradictions. Order, economic development and medical technologies permitted the decline of death rates, while ancient ways of living and thinking among the peasants insured that birth rates remain at or near the levels that had been essential to biological and cultural survival in earlier centuries.

<sup>1</sup> Office of Population Research, Princeton University.

Technical assistance and economic development for the countries of Asia are today discussed as international responsibilities. Their justification is phrased in terms of political, economic, and humanitarian goals that together constitute a rational good for both recipient and donor nations. There are critical differences between this contemporary movement and those that preceded it under imperial auspices, but the basic similarities are sufficient to raise serious questions concerning the demographic consequences. Many students of the East, and probably most demographers, suspect that the major consequence of socially unplanned economic action may be the maintenance of additional people within an all-pervasive poverty. Other students, more immersed in scientific and technical pursuits, see today's potentialities for human subsistence so expansive as to make the problem of man's numbers in the foreseeable future one requiring only minor adjustments. Hence it becomes essential to search within the experience of the past, and particularly that of Asia, for experience that will permit analysis of the demographic consequences of economic development. The classic historical experiment is Imperial Japan, for here industrialization proceeded within an Eastern culture that remained sovereign at the same time that it extended its area of political hegemony and economic utilization to include other Asian peoples.

#### GENERAL PARALLELS—JAPAN AND THE WEST

The processes of population increase, distribution, and manpower utilization in an industrializing Japan were similar to those that occurred earlier in the countries of the West. In premodern Japan some thirty million people secured a precarious subsistence from the limited land. Deficiencies in the quantity and quality of the food available for local consumption combined with the general ignorance of medical and sanitary practices to make peasant and urban dwellers alike vulnerable to the disorganization and the physical destruction of typhoon, flood, and fire. Famine and epidemic were so common

as to be noted in the chronicles only when they became devastating forces of extinction over wide regions. People and culture survived only because the attitudes, the values, and the taboos of family, community and state were compulsive forces channeling the lives of women into early marriage and frequent child-bearing.<sup>2</sup>

The opening to the West, and particularly the power-oriented state that followed the Meiji Restoration, brought an expanded and more intensive agriculture and an accelerating industrialization that provided employment opportunities for the youth of the countryside and moved a once-peasant people cityward. Mortality declined even during the early decades of modernization. Fertility changed more slowly, for the resistances of an ancient and integrated rural culture were buttressed by the resources of a state whose preeminent goal involved the creation of political and economic power within an oligarchic social structure. The forces generated by the industrialization process were more compulsive than those that had evolved in the agrarian world of the past, though, for even the conservative forces of a society continuous for millenia could not achieve that segmentation of culture and personality implicit in the co-existence of a changing economy and a stable social system. It was impossible to base the industrialization essential to power on an illiterate peasantry. And a former peasantry, educated, concentrated in cities, subject to the pressures of a pecuniary economy and exposed to the potentialities of that economy for material advancement and psychological liberation, could but

<sup>2</sup> This is not to deny the existence of abortion and infanticide as folk techniques of population control in premodern Japan. The critical question is not their existence but the extent of their practise throughout the population and the magnitude of their impact on the number of live births allowed to survive the process of birth and hence become subject to the very high rates of mortality that existed in the Japan of that period. The analysis of the hazards implicit in day-to-day living and the recorded losses from famines, epidemics, and the cataclysms of nature indicate that death rates must have fluctuated irregularly on a very high level. Hence the existence of a relatively unchanging total population in the eighteenth and early nineteenth centuries would have necessitated a birth rate that, for the country as a whole and over substantial periods of time, equalled the death rate. The fact that Japan's population was not declining precipitantly throughout the last century and a quarter of the feudal period means that the contemporary reports of the frequency of infanticide must be gross exaggeration if applied to the country as a whole.

question if it did not evade the obligation of abundant parenthood.

The first three quarters of a century of controlled modernization produced appreciable declines in death and birth rates. By the 'thirties fertility was falling more rapidly than mortality. Mechanical projection was tempting and many "predictions" were made. Although they varied in the complexity of their mathematics, all assumed continued declines in fertility and mortality, without explicit consideration of the social and economic developments required for the achievement and support of the numbers forecast. The majority of these estimates indicated that the population would increase to some 90 millions by 1960 and reach a maximum of perhaps 100 to 115 millions near or after the end of the century. Eventually the people of an industrialized Japan, as those of an industrialized West, would cease to increase. Moreover, as contrasted with the West, the period of transition would be shortened and the multiplier would be less. Japan would take only a quarter of a century to approach the new stability of low birth and death rates, and population increase would be only three or four-fold. This, it should be noted, is the optimistic picture of the decade before World War II.

If we examine the transformations in the geographical distribution and the internal structure of the population, the situation in Japan is again comparable to that in the West. The proportion of the population that was rural declined with relative consistency from 1872 to 1940; the *number* of people in the rural areas changed little between 1872 and 1930, and declined thereafter. Cities and non-agricultural employment absorbed their own natural increase and the major portion of that of the rural areas beyond maintenance requirements. Youth left agriculture and the rural areas, adjusted early to the relatively greater economic opportunities and the freer social atmosphere of the cities, founded their own families at considerably later ages than would have occurred in the ancestral villages, and limited the numbers of their children to correspond more nearly

to the realities of a pecuniary economy. Declining fertility and hence the solution to the problems of growth created by modernization appeared to inhere in urbanization, itself an essential correlate of industrialization. Residential and occupational movement away from the peasant village and its agrarian activities was the overt manifestation of the cultural and psychological transformation that signalized the "Westernization" of the Japanese and their escape from the economic difficulties of increasing numbers.

Japanese experience demonstrates that the population growth which accompanies industrialization is time-limited in the East as in the West. It is essential to note, however, that in Japan, a unique combination of political, economic, and social factors facilitated industrialization, urbanization, declining mortality, and declining fertility. Even under these particular circumstances, generally more favorable than those that now exist elsewhere in Asia, the modernization process involved a population increase of more than two and one-half times within its first century. The sheer magnitude of the numbers involved is significant if Japan is regarded as a laboratory experiment in what might happen elsewhere—and the problem of how Japan utilized those increasing numbers is just as relevant a part of her demographic history as is the description of how changing fertility and mortality generated the numbers.

There is a further barrier to the generalization of Japanese experience as a basis for assessing probable occurrences in other modernizing Asian areas, and it is a formidable one. Japan achieved her economic-demographic transition through the intermediation of an imperial system that utilized the products of other regions of Asia without contributing proportionately to the modernization of the subject peoples. The process of capital formation itself involved the assertion of the supremacy of the state over the welfare of the individuals. Thus, whether considered in relation to the people of Japan or to those of the conquered areas, the "success" of Japan's solution to the demographic problems of modernization is not a suffi-

cient answer to the question of its relevance to planning for the future in other areas. Democratic peoples might hesitate to offer or to accept economic assistance if the demographic hazards of the future could be averted only by political, economic, and welfare actions inconsistent with the democratic process. Hence it becomes essential to examine the demographic development of modern Japan in somewhat more detail, with emphasis on the magnitude of the population expansion, its relationship to economic expansion and the urbanization process, and the interconnections of demographic and economic transformations as manifest in changing patterns of manpower utilization with political expansionism and war.

#### DEMOGRAPHIC EXPANSION

The people of Japan numbered 30 million in the middle of the nineteenth century, 35 million at the time of the Meiji Restoration. In 1920 there were 56 million people. In 1940 there were 73 million. (Table 1). Increase of this order of magnitude is difficult to comprehend. The increase of 17 million in two decades was greater than the population of the Philippine Islands in 1939, as great as that of Korea in 1920. It would have peopled an empty Japan with 115 persons per square mile. Each year there were three-quarters of a million additional claimants to the products of the Japanese economy.

In Japan, as elsewhere in Monsoon Asia, population increase occurred among a people already densely settled on the land suitable for utilization with existing techniques. In 1920, the number of persons per square mile of total area was 380; in 1940, it was 500. These are crude figures, for Japan is a land of mountains and turbulent rivers, where only one acre in each six is cultivable. If we make our assumption of equal distribution somewhat more realistic and allocate the people to the land that was cultivated or regarded as available for cultivation, we secure density figures that are startling. In 1920, in this country still predominantly peasant, there were almost 2,500 people per square mile of cultivable land. If the 17 mil-



AREA	1920	1925	1930	1935	1940*
POPULATION (IN THOUSANDS)					
The Empire	77,729	84,279	91,421	98,934	105,226
Japan Proper	55,963	59,737	64,450	69,254	73,114
Outlying Areas	21,766	24,542	26,971	29,680	32,112
Korea <sup>a</sup>	17,264	19,523	21,058	22,899	24,326
Taiwan	3,655	3,993	4,593	5,212	5,872
Karafuto	106	204	295	332	415
Kwantung <sup>b</sup>	688	766	956	1,134	1,367
South Seas <sup>c</sup>	52	56	70	103	131
AMOUNT OF INCREASE					
The Empire		6,550	7,142	7,513	6,292
Japan Proper		3,774	4,713	4,804	3,860
Outlying Areas		2,776 <sup>d</sup>	2,429	2,709	2,432
Korea <sup>a</sup>		2,259 <sup>d</sup>	1,535	1,841	1,427
Taiwan		338	599	620	660
Karafuto		98	91	37	83
Kwantung <sup>b</sup>		78	190	178	233
South Seas <sup>c</sup>		4	13	33	29
PER CENT INCREASE					
The Empire		8.4	8.5	8.2	6.4
Japan Proper		6.7	7.9	7.5	5.6
Outlying Areas		11.3 <sup>d</sup>	9.0	9.1	7.6
Korea <sup>a</sup>		13.1 <sup>d</sup>	7.9	8.7	6.2
Taiwan		9.2	15.0	13.5	12.7
Karafuto		92.4	44.9	12.5	25.0
Kwantung <sup>b</sup>		11.8	24.8	18.7	20.6
South Seas <sup>c</sup>		7.8	23.7	47.3	27.9

Table 1. Demographic expansion of the Japanese Empire, 1920-1940.\*  
(Total population of each area.)

\* Kōjima, Reikichi. *Waga kuni saikin no fukun oyobi toshi jinkō, Shōwa jugō-nen Kokusei chōsa no kekka ni yoru.* (The population of the prefectures and cities of Japan in most recent times.) *Toshi mondai pamfureto* (Municipal Problems Pamphlet), No. 41. Tokyo, 1941. 35 pp. Translation by Edwin G. Beal, Jr., in *Far Eastern Quarterly* 3(4): 313-362. Aug. 1944.

<sup>a</sup> A "special survey" rather than a census was taken in Korea in 1920.

<sup>b</sup> The Kwantung Leased Territory alone is included in this compilation. The South Manchuria Railway Zone, formerly a part of the Empire, was attached to Manchoukuo in 1937.

<sup>c</sup> Nanyō-guntō, the South Sea Islands received as a mandate from the League of Nations.

<sup>d</sup> Since the special survey taken in Korea in 1920 was probably an undercount, the increase between 1920 and 1925 may be over-estimated for Korea and hence for the Outlying Areas and the Empire as a whole.

\* The censuses of 1920-1935, inclusive, were *de facto* enumerations of the populations of the various areas. In 1940 the enumeration of the general civilian population was *de facto*, but members of the armed forces and persons attached thereto wherever they might be, whether within or outside the Empire, were allocated to the place of enumeration of their nearest of kin.



lion people who were added to the Japanese population between 1920 and 1940 had been equally distributed over the cultivable land, there would have been 740 additional persons on each square mile. By October 1, 1940, the hypothetical allocation of equal areas of cultivable land to each person would yield 3,200 persons for each square mile of such land.

Citation of rates of population increase, density figures, or other population statistics for Japan Proper as measures of the demographic transformation of the Japanese people ignore the essential characteristic of that transformation, its integral relationships with political and economic expansionism within and outside the Home Islands. In the late nineteenth century the island of Hokkaido was occupied in a northward thrust that carried the Japanese up through the southern part of Saghalien Island. Expansionism turned southward and the Ryu-ku Islands were added to Japan Proper, Taiwan to the Empire. In the early twentieth century the drive to economic and political advance focused landward. The Kwantung Leased Territory, the South Manchuria Railway Zone and Korea were added to the Empire. The South Sea Islands, which Imperial Germany had once held, were acquired after World War I as a mandate from the League of Nations and added to the Empire in fact if not in legal right.

Japanese moved outward to the islands of the Pacific, across the narrow waters to northeastern Asia, and eventually southward below the Great Wall. (Table 2). In 1920 there were 726 thousand Japanese in the colonial areas outside Japan Proper, including the military; in 1940, there were 1.7 million, excluding the military. This was internal redistribution in a sense, for it was movement under the Japanese flag. Expansion beyond the area of Japanese sovereignty but within the area of political hegemony increased sharply during the 'thirties. In 1920 some 580 thousand were beyond the jurisdiction of Japan, at least in theory. In 1940, the number abroad had increased to 1.9 million, of whom 820 thousand were in "Manchoukuo," 365 thousand in occupied North China. This redistribution

and expansion of the Japanese reflected a complex adjustment of social and economic pressures at home, economic opportunities abroad. The main concentrations remained in Japan Proper, though, for here lived 99 per cent of the world's Japanese in 1920, 97.5 per cent in 1940.

The relevance of population increase to economic and political transformation cannot be assessed easily from the statistical data on the maze of movements and counter-movements that produced the internal redistribution and the external expansion portrayed in the preceding tables. It can be deduced in hypothetical form, though, if we assume that on October 1, 1920, all Empire nationals and aliens are expelled from Japan and the Home Islands are sealed as they had been throughout the centuries of Tokugawa control. Within this stable and isolated universe births and deaths occur at the age-specific rates

Table 2. Demographic expansion of the ethnic Japanese, 1920-1940.\*

AREA	NUMBER OF ETHNIC JAPANESE (IN THOUSANDS)			PER CENT INCREASE IN ETHNIC JAPANESE		
	1920	1930	1940	1920-1930	1930-1940	1920-1940
The World	57,191	65,766	75,372	15.0	14.6	31.8
The Empire <sup>a</sup>	56,611	65,149	73,500	15.1	12.8	29.8
Japan Proper <sup>b</sup>	55,885	63,972	71,810	14.5	12.2	28.5
Outlying Areas <sup>a</sup>	726	1,177	1,690	62.1	43.6	132.8
Korea	377	527	708	39.9	34.3	87.8
Taiwan	164	228	312	39.0	36.8	90.2
Karafuto	103	284	395	176.3	38.8	283.7
Kwantung	79	118	198	50.0	68.1	152.0
South Seas	3	20	77	476.8	292.3	2163.0
Foreign Countries <sup>c</sup>	580	617	1,872	6.3	203.4	222.5

\* 1920: Nihon. Naikaku tōkei-kyoku. (Cabinet Bureau of Statistics): *Taishō kunen Kokusei chōsa ki-jutsu-hen*. (Descriptive summary of the 1920 census.) Appendix. Tokyo, 1933. 1930. *Ibid.*: *Shōwa gonen Kokusei chōsa saishū hōkoku sho*. (Final report of the 1930 census.) Tokyo, 1938. 1940. Japan. Cabinet Bureau of Statistics: *Census of 1940. Selected tables*. Microfilm copy. Library of Congress, Washington, D. C. Table 1. The number of Japanese in foreign countries in 1940 is based on a compilation from Japanese sources, modified where census or registration data permitted more accurate estimation.

<sup>a</sup> Excluding the South Manchuria Railway Zone, which became part of "Manchoukuo" in 1937 and hence technically outside the Empire.

<sup>b</sup> Ethnic Japanese only, i.e., excluding natives of the Empire and aliens.

<sup>c</sup> Including the South Manchuria Railway Zone, which had a Japanese population of 81 thousand in 1920 and 107 thousand in 1930.

that characterized the actual population of Japan from 1920 to 1940. Let us now limit the analysis to men, and assume that each man enters the labor force at age 15 and remains in it continuously until death or retirement at age 65. Furthermore, there is no expansion of economic opportunities, and no job is vacated except by the death or retirement of its holder. Japan's population problem thus becomes by definition the increase of her manpower between the ages of 15 and 65, for adjustment techniques, whether economic, political, or demographic, are ruled out by definition. Under these assumptions there would have been 180 Japanese entering labor force ages for each 100 vacancies created by death or retirement. One hundred of these 180 potential entrants would be utilized; eighty would find no place within this completely occupied and stationary economy. In other words, 45 per cent of the annual increment to the number of men in the productive ages would be surplus. Given the validity of the assumptions underlying the computations, this would be the measure of Japan's demographic difficulties.

Before considering the actual relationships between numbers, economic development, and politico-economic factors in Japan, let us transfer Japanese rates of demographic expansion by direct analogy to some regions of potential modernization and assess the magnitude of the numerical increase that would occur if their demographic developments should perchance follow those of Japan. Instead of a China or an India where numbers quickly become fantastic, let us consider Indonesia, for here the Outer Islands and their resources may permit an orthodox pattern of economic-demographic modernization for crowded Java. If Indonesia should follow the path of Japan, today's 76 million people would become 140 millions by the second decade of the twenty-first century. Java's own population would be little beyond its present 50 millions, perhaps less, for the necessary food for the increasing people would be produced on lands now utilized only by the inefficient techniques of the native peoples of the Outer Islands. The major portion of the hypothetical increase of some 65 million people would have been

absorbed in the new industrial developments, perhaps located in the Outer Islands. Great cities with millions of inhabitants would have replaced the Balipapans of today. Perhaps this is a possible picture, perhaps not. In any event, the internal migration of the maturing youth of Java's over-crowded areas to developing industrial centers in the Outer Islands is implicit in the plans of Indonesia's leaders who are cognizant of the demographic dilemma that underlies their economic development plans.

This planning for the year 2025 would not be terminal, though, for a further fifty per cent increase would lie ahead. Indonesia's ultimate population would go beyond 200 million, the Philippines under comparable assumptions beyond 60 millions.

#### ECONOMIC TRANSFORMATION

The economic transformation of Japan in the seventy-five years of its history as an expanding imperial power was a movement away from agricultural self-sufficiency toward an industrial and a commercial economy dependent on the world market alike for the purchase of its raw materials and the sale of its finished products. At the beginning of the 'twenties Japan's industry was predominantly textile, cocoons and silks tying the agricultural and the industrial segments of the economy together in dependence on the vagaries of taste and the fluctuating purchasing power of American women. The 'twenties were a period of expansion in the traditional pattern. The major exports were textiles and those cheap products of the small shop and sweated labor that had come to stigmatize the label, "Made in Japan." The depression of the late 'twenties and the early 'thirties shattered the world's demand for Japan's silk and cotton textiles. Poverty spread in ever-widening circles from the employees in the textile mills to the small farmers who supplemented agricultural production with the cultivation of mulberry trees and the raising of cocoons. The depreciation of the yen, increasing efficiency in organiza-

tion, and controlled sales restored Japanese products to the world markets, but only at the heavy price of depressed wages at home and increased accusations of "dumping" abroad. World trends toward economic autarchy, controlled trade, managed currencies, and the political manipulation of economic relationships seemed to threaten the economy of a nation that required trade to survive.

Awesome predictions of the fate awaiting the multiplying Japanese again proved false. By the end of the 'thirties Japan's strengthened and diversified economy indicated progress toward mature industrialization. The index of industrial productions, with a base of 100 in 1930-1934, reached beyond 200 in 1941. The production of the metal and the chemical industries had trebled, while the manufacturing of machinery had increased six-fold.<sup>3</sup>

The immediate demographic consequence of the economic transformation of the interwar decades was the urbanization of the population structure, for the city-ward movement of the peasant was an essential aspect of the process of capital formation, industrialization, and political expansion. The villages and the smaller towns became producers of children, exporters of youth, and havens for the aged. The maturing youth moved toward the cities and non-agricultural employment in such numbers as to create an urbanization seldom paralleled in the history of the West. (Table 3).

Between 1920 and 1940 the population of the cities (*shi*) increased from 10.1 to 27.6 millions, while that of the rural areas (*gun*) changed only from 45.9 to 45.5 millions. Fewer than five million people lived in cities of 500,000 and over in

<sup>3</sup> Economic progress was a by-product of military expansion and preparedness for further expansion. The response of Japan's statesmen and military leaders to a constricting outer world and cumulating internal friction was an outward surge that carried the Kwantung armies into Manchuria and established a Manchu emperor on a puppet throne. The decade of heavy capital investment thus initiated resulted in the establishment of an economic and military bastion from which the Soviet Union could be held while China below the Great Wall was invaded. In Taiwan, Korea, and Karafuto there was forced industrialization somewhat comparable to that of Japan's early post-Restoration period, and here too it was oriented toward heavy industry and military preparedness.

1920; 14.4 million lived in such cities in 1940. In relative terms, the population living in communes of 10,000 or less declined three per cent during this twenty-year period, while that in cities of 100,000 and over more than trebled.

The urbanward movement was predominantly from the rural area to the large city or the great metropolitan center. In 1920 over two-thirds of the total population lived in communes of less than 10 thousand population. Only half lived in such communes in 1940. In 1920 one in each twelve or so persons lived in a city of 100,000 or more. In 1940, one in each five lived in such a city. All the provinces of Japan contributed substantial portions of their natural increase to the great metropolitan cities of Tokyo, Yokohama, Nagoya, Osaka, Kyoto, and Kobe. In fact, for the interwar decades as a whole

Table 3. The urbanization of the population structure of Japan Proper, 1920-1947.\*

YEAR	POPULATION BY SIZE OF COMMUNES* (IN THOUSANDS)					
	Total	Under 10,000	10,000-50,000	50,000-100,000	100,000-500,000	500,000 +
<i>Prewar Area</i>						
1 October 1920	55,963	37,927	9,177	2,105	2,128	4,626
1 October 1925	59,737	37,884	9,667	3,445	2,538	6,203
1 October 1930	64,450	38,158	10,409	4,402	3,876	7,605
1 October 1935	69,254	37,502	10,549	3,685	4,873	12,645
1 October 1940	73,114	36,627	11,338	3,858	6,907	14,384
<i>Postwar Area</i>						
1 October 1940	72,540	35,998	11,457	3,792	6,907	14,384
1 November 1945	71,996	39,460	16,126	5,397	5,045	5,969
26 April 1946	73,114	38,482	15,630	5,537	6,389	7,076
1 October 1947	78,098	38,690	16,474	6,148	7,778	9,009

\* 1920-1940, *prewar area*. Compiled from the appropriate volumes of the respective censuses of Japan. 1940-1947, *postwar area*. SCAP, Economic and Scientific Section, Research and Programs Division: Distribution of population of Japan by *shi*, *machi*, and *mura* in selected size groups 1940, 1945, 1946, 1947. *Japanese Economic Statistics, Bulletin, Section III. Population, Labor, Food, and Prices*. Bulletin No. 34, June, 1949. Also Ueda Masau: Some recent tendencies in urban and rural population. Tables. *The Third General Meeting of the Population Association of Japan, Data Paper*. 13 November, 1949.

\* Commune is used as a general term to include *shi* (cities), *machi* (towns), and *mura* (villages). English equivalents are approximate only. Area classifications are as of the census date.



Table 4. Economic utilization of the population of Japan Proper, industrial classification of the gainfully occupied, 1920, 1930, and 1940.\*

STATUS	TOTAL POPULATION				MALES				FEMALES			
	1920	1930	1940		1920	1930	1940		1920	1930	1940	
	NUMBER (IN THOUSANDS)											
<b>TOTAL</b>	55,063	64,450	73,114		28,044	32,390	36,566		27,919	32,060	36,548	
Armed Forces <sup>a</sup>	250	243	1,694		250	243	1,694					
Civilian Population	55,713	64,207	71,420		27,794	32,147	34,872		27,919	32,060	36,548	
Unoccupied	28,702	34,830	38,937		11,057	13,360	15,142		17,645	21,470	23,795	
Occupied <sup>b</sup>	27,011	29,377	32,483		16,737	18,787	19,730		10,274	10,590	12,753	
Agriculture & Forestry	14,128	14,131	13,842		7,750	7,785	6,619		6,378	6,396	7,223	
Fishing	558	568	543		517	515	476		41	53	67	
Mining	425	316	598		328	271	529		97	45	69	
Manufacturing & Construction	5,300	5,876	8,132		3,716	4,428	6,178		1,594	1,448	1,954	
Commerce	3,188	4,906	4,882		2,188	3,406	3,006		1,030	1,500	1,876	
Transportation & Communication	1,037	945	1,364		975	907	1,214		62	38	150	
Government & Professional	1,192	1,762	2,195		884	1,369	1,515		308	393	680	
Domestic Service	655	802	709		71	92	39		584	710	670	
Miscellaneous	528	71	218		338	64	154		190	7	64	
	PER CENT OF GAINFULLY OCCUPIED											
<b>TOTAL</b>	100.0	100.0	100.0		100.0	100.0	100.0		100.0	100.0	100.0	
Agriculture & Forestry	52.3	48.1	42.6		46.3	41.2	33.5		62.1	60.4	56.6	
Fishing	2.1	1.9	2.7		3.1	2.7	2.4		0.4	0.5	0.5	
Mining	1.6	1.1	1.8		2.0	1.5	2.7		0.9	0.4	0.5	
Manufacturing & Construction	19.6	20.0	25.0		22.0	23.6	31.3		15.4	13.7	15.3	
Commerce	11.8	16.7	15.0		12.9	18.1	15.2		10.0	14.2	14.7	
Transportation & Communication	3.8	3.2	4.2		5.8	4.8	6.2		0.6	0.3	1.2	
Government & Professional	4.4	6.0	6.8		5.3	7.3	7.7		3.0	3.7	5.3	
Domestic Service	2.4	2.7	2.2		0.4	0.5	0.2		5.7	6.7	5.3	
Miscellaneous	2.0	0.3	0.7		2.0	0.3	0.8		1.9	0.1	0.5	

\* 1920, Nihon, Nankaku tokel-kyoku (Cabinet Bureau of Statistics); *Toshio kusen Kokusei chosa koku*, (Reports of the 1920 census). *Zenkoku no bu*, (Section on all Japan.) *Shokugyo*, (Occupations) Tokyo, 1929. Reallocations to produce as much comparability as possible with the later classifications of occupied and unoccupied, 1936. Ibid.: *Shōwa gonen Kokusei chosa koku*, (Reports of the 1930 census.) *Shokugyo oyobi sangyo*, (Occupations and Industries), Tokyo, 1936, 1940. United States Strategic Bombing Survey, Manpower, Food, and Civilian Supplies Division: *The Japanese Wartime Standard of Living and Utilization of Manpower*, Washington, 1947, Table FF, p. 124.

<sup>a</sup> The armed forces in 1920 and 1930 included only those present in Japan Proper who could not be allocated to another category; the occupational forces in 1920 or in 1930 included only those present in Japan Proper who could not be allocated to another category. The occupational forces in 1920 or in 1930 included only those present in Japan Proper who could not be allocated to another category. The occupational forces in 1920 or in 1930 included only those present in Japan Proper who could not be allocated to another category.

<sup>b</sup> The unemployed are included, classified according to the industry of the usual employment.



the net migratory gain of the seven metropolitan provinces (Tokyo, Kanagawa, Aichi, Osaka, Kyoto, Hyogo, and Fukuoka) was greater than the net migratory loss of the remaining forty provinces of Japan, for these provinces attracted not only Japan's own provincials but also the immigrants of Empire.

#### THE UTILIZATION OF INCREASING MANPOWER

The economic force that underlay urbanization was industrialization, including under that broad term the expansion of manufacturing industry and the facilities and services necessarily associated with it, as well as the increasing efficiency of primary production that accompanies advances in techniques and facilities for production and distribution. The human aspect of this industrialization was the changing industrial allocation of the labor force. Agriculture, forestry, and fishing declined in relative importance, while manufacturing, commerce, transportation, and communication increased. (Table 4.) The maintenance of a relatively unchanging population in agriculture was accompanied by a rapid increase in both the numbers and the proportions of the people who secured their livelihood from sources other than agriculture. In 1920, agriculture absorbed slightly more than half those reporting themselves as gainfully occupied, whether employed or not; in 1930, it absorbed slightly less than half; in 1940, it absorbed only 43 per cent. This is an under-statement of the extent of the economic transformation, though, for it is distorted by the numbers of women who are reported as gainfully occupied in agriculture. If men alone are considered, the proportion gainfully occupied in agriculture was 46.3 in 1920, 41.2 in 1930, and 33.5 in 1940.

A more incisive picture of the way in which Japan utilized the increasing numbers of people generated by the modernization process is given if attention is focused on the utilization of the increments rather than on the more traditional pattern of the changing proportions within the civilian labor force. If we consider only the increase in the population physically pres-

ent within Japan Proper, we find that the number of persons aged 10 and above increased 13.5 millions between 1920 and 1940. This figure is complicated in derivation, however, for it represents the balance of the natural increase of the Japanese in Japan Proper, the losses of the Japanese through emigration from Japan, and the gains of Empire Nationals, primarily Koreans, through immigration.

By 1940 over one million Japanese men aged 10 and above had been lost to Japan through the civilian migration that occurred between 1920 and 1940. This removed 14 per cent of the potential increase of 7.7 million men in labor force ages. The impact of these migrations on the labor market was greater than this overall figure would indicate, for migration removed one-fourth of the total increase in the number of men in their twenties, one-fifth of the number in their thirties. This was removal for civilian utilization. If we add to the 1.0 million civilian migrants the 1.4 million men removed from the potential increase in the civilian labor pool through absorption into the armed services, we discover that only two-thirds of the increase in adult manpower was available for civilian utilization within Japan Proper. The number of men aged 20 to 24 available for such utilization in 1940 was actually less than it had been in 1920. The real problem of Japan became the inadequacy rather than the increase of manpower—and in the twenty years under consideration more than half a million Korean men aged 10 or over moved in to fill the jobs vacated by the Japanese who had either moved upward occupationally in Japan Proper and the Empire or had been absorbed into the armed forces.

This is a simplified summary of the changing pattern of manpower utilization, civilian and military, within Japan Proper and within the Empire. It may suffice to indicate the complexity of the economic problems presented by rapid and continuing increase in the population in the productive ages. Moreover, it reveals the inadequacy of numerical increase considered apart from an economic and cultural context as a

measure of either the nature or the magnitude of the economic and political problems or the relative success of the factors tending toward their resolution. Within Japan Proper there were increasing numbers of persons in the productive ages, but military expansion, the development of the heavy industries and direct war production, all necessary concomitants of imperial expansion, provided employment opportunities for large numbers. There were other factors, for at the same time that the safety valves of emigration and militarism operated to remove persons from the civilian labor market, increased public school education and diffusing retirement practices lessened labor force participation among the young and the old. With these dual drain-offs of potential workers plus the existence of the rural areas as subsistence security for the urban unemployed, Japan solved her problems of increasing manpower.

#### WAR AND ITS AFTERMATH

Solutions achieved through militarism are necessarily transitory, for the process creates a dynamism that forces its own continuation. For Japan, the end occurred much more speedily than for the British Empire whose history the Japanese imagined themselves to be repeating. The 'twenties were a decade of peace and accumulating population pressure, the 'thirties a decade of war, preparedness for further war, and manpower deficiencies. If the pattern of the past had continued, the 'forties would have been a period of reorganization and economic development preparatory to another politico-economic expansion of the type that had characterized Japanese history from the acquisition of Taiwan to the creation of Manchoukuo. But the pattern broke. The premature challenge of the West was followed by military defeat, the restoration of the Tokugawa boundaries, and the liquidation of Empire.

The Empire vanished, but the people who were the product of industrialization and imperial expansion survived in major part. The four million natural increase of the war years far surpassed the 1.7 million military dead. Almost six million of

the emissaries of Empire, civilian and military, were returned to the constricted frontiers of a Japan with levelled cities, ruined industries and vanished markets. The Japan of 1947 with its limited economy included 78.6 million people, 3.5 million more Japanese than lived in all the East in 1940.

This is not the end of the tale. Threatening epidemics were conquered, food supplies restored, and the death rate forced downward. A baby boom contributed further to the increasing population. By January 1, 1949, there were 81 million people in the four main islands of Japan Proper, over ten million more than there had been when this was the heartland of an economic development whose nexus of trade penetrated the East and beyond, the center of a military organization that included 100 millions in the Empire, 40 millions in puppet Manchoukuo, and uncounted millions in the occupied areas of China.

Rapid increase in the numbers of adult men and women will continue for decades in the future. If deaths remain at the level of 1948 and there is no movement to or from Japan except the repatriation of some five to six hundred thousand persons between 1947 and 1953, the number of men in the productive ages between 15 and 60 will increase from some 22 millions in 1947 to some 31 millions in 1967, an increase of over 40 per cent in twenty years. This increase in the coming decades is larger both absolutely and relatively than that which occurred in the twenty years between 1920 and 1940.

#### THE BROADER RELEVANCE

The heritage which almost a century of economic development left to a Japan whose economic and political system was shattered while her people remained largely intact is considered in another paper in this series. Here we shall attempt a tentative generalization of the relevance of the Japanese experience for other densely settled areas in process of or contemplating comprehensive industrialization.

Japan constitutes one case study in the demographic correlates of modernization of a predominantly industrial type, albeit

a peculiarly significant one. Japan's historic culture was Eastern. Her industrial and urban transformation was thus divorced from a base in the non-material culture of the West except in so far as specific elements were deliberately selected for imitation or diffused through more informal mechanisms. Japan was shrouded in the quiescent seclusion of the Tokugawa baku-fu when Europe awakened in the Renaissance and the Reformation. She had no Protestant ethic whose interconnections with the evolution of capitalism could be debated, no church whose familial pronouncements implemented the Pauline philosophy. Yet here within the East the demographic correlates of industrialization were roughly comparable to those in the West.

The population growth that accompanies indigenous and comprehensive industrial development and the slowing of that growth through a progressive limitation of child-bearing are alike products of the changes in ways of living and thinking that are precondition and product of industrialization. The relations of culture and demography proceed through the intermediation of the economic process itself. Political stability, a disciplined labor force and rapid capital accumulation are necessary aspects of substantial industrialization. Cultural factors exert a major influence on the extent and the speed of the economic transformation, for there are cultural preconditions to indigenous economic transformations and cultural limitations to imposed transformations. As industrialization extends over time and expands over wider segments of a nation, the demographic transition of declining mortality and declining fertility becomes a necessary consequence of the accompanying economic pressures and cultural stimuli. But industrialization regarded as economic, political, or social process is in turn modified by the changing dynamics of population. The relationships are complex; the particular constellation of factors that produced the population growth of Imperial Japan will not be duplicated in detail elsewhere. The fundamental fact, though, is that experience within the East corroborates the

hypothesis deducible from Western experience: substantial increase in the size of the total population is a correlate of industrialization, but the social and psychological transformations implicit in industrialization result eventually in a lessened rate of reproduction and a slowing growth. Given the technologies and the basic values of the twentieth century, both population growth and the ultimate slowing of that growth are predictable consequences of the industrial and urban transformation of agrarian cultures.

The demographic consequences of industrialization constitute a powerful propulsion toward further industrialization. Phrased in negative terms, industrialization is not a reversible process. To break the dynamism of the economic transformation in midstream is to leave the already cumulated people without the means of procuring the subsistence essential to the maintenance of life. The alternatives in this situation are few. Aggressive action may be attempted, but with a broken economy this is unlikely; if attempted it can only intensify the ultimate problem through defeat. If the political unit has already made the outward thrust and been defeated there may be external subsidy, but this is temporary solution. Hence the most probable consequence of the cessation of expansionism in a situation of continued population increase is a sharp deterioration of living levels. If the industrialization is actually reversed after its long continuation has generated really high densities on limited land, the consequence in the absence of subsidy or flight must be the death of that portion of the people who are "surplus" in the drastically altered resources-cultural-technology matrix.

Japanese demographic evolution paralleled that of the West in earlier decades, with differences explainable in terms of resources, history, technology, and culture. Will Japanese experience then predict within similarly broad limits that which is to occur in other densely settled Eastern areas? This, the critical question for those determining political and economic policy for other under-developed areas, cannot be answered



from population analysis alone. To assume complete parallelism between Japan and an industrializing mainland would be unrealistic. But to ignore the possibility that there may be similar integral relations between economic development, population growth, expansionism, and conflict would be politically hazardous.



## SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY

### X. FERTILITY PLANNING AND FERTILITY RATES BY RELIGIOUS INTEREST AND DENOMINATION<sup>1</sup>

RONALD FREEDMAN AND P. K. WHELPTON

THIS paper is a report on the investigation of the following hypothesis: "The greater the interest in religion, the lower the proportion of couples practicing contraception effectively and the larger the planned families." This is one of a series of hypotheses being tested in the Study of Social and Psychological Factors Affecting Fertility.

A number of previous investigations have been made of certain aspects of the relationship of religious affiliation and fertility. Another study in the present series<sup>2</sup> has found marked differences between the fertility rates of Catholics, Protestants, and Jews in Indianapolis. Similar results have been reported in other places.<sup>3</sup> A recent investigation in England<sup>4</sup> reported systematic differences in the family limitation practices of Catholics, Protestants, and Jews. A study<sup>5</sup> of the families of a group of Air-Corps officers found that while reported ideal family size was not related to religious denomination (Catholic

<sup>1</sup> This is the tenth of a series of reports on a study conducted by the Committee on Social and Psychological Factors Affecting Fertility, sponsored by the Milbank Memorial Fund with grants from the Carnegie Corporation of New York. The committee consists of Lowell J. Reed, Chairman; Daniel Katz; E. Lowell Kelly; Clyde V. Kiser; Frank Lorimer; Frank W. Notestein; Frederick Osborn; S. A. Switzer; Warren S. Thompson; and P. K. Whelpton.

<sup>2</sup> Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. I. Differential Fertility Among 41,498 Native-White Couples in Indianapolis. The Milbank Memorial Fund *Quarterly*, July, 1943, xxi, No. 3, pp. 221-280. (Reprint pp. 1-60).

<sup>3</sup> e.g., Charles Enid: THE CHANGING SIZE OF THE FAMILY IN CANADA. Census Monograph No. 1, Eighth Census of Canada, 1941. Ottawa, Dominion Bureau of Statistics, 1948, Ch. IV; also Notestein, Frank W. and Kiser, Clyde V., Factors Affecting Variations in Human Fertility. *Social Forces*, Oct., 1935, 14, No. 1, pp. 32-41.

<sup>4</sup> Lewis, Fanning, E.: Report on an Inquiry Into Family Limitation and Its Influence on Human Fertility During the Past Fifty Years. *Papers of the Royal Commission on Population*, Vol. I. London, His Majesty's Stationary Office, 1949.

<sup>5</sup> Flanagan, John C.: A Study of Factors Determining Family Size in a Selected Professional Group. *Genetic Psychology Monographs*, Feb., 1943, Vol. 25, pp. 3-101.

or Protestant), it was related to the extent of early religious training of the wife and the church attendance of the husband. However, a study of Catholic families in a Florida diocese found that degree of faithfulness in religious observances was not related to fertility, except that couples married by a priest had higher fertility rates than those who were not.<sup>6</sup> Finally, a number of scholars have stressed the possible importance of religion in maintaining high fertility rates in the Far East and other pre-industrial areas.<sup>7</sup>

The present study deals with the relationship of religious interest and reproductive behavior among a sample of urban Protestants. This is a relatively homogeneous group and is representative of a large part of the American population.

An important theoretical basis for the hypothesis is that degree of religious interest and participation may be considered to be negatively an index of rationalism and positively an index of the acceptance of traditional values. "Rationalism" as used here refers to the critical examination of alternative courses of action with a view to choosing among them. This is in polar contrast to the unquestioning acceptance of the traditional course of action. Religious interest and participation frequently are believed to minimize the area of rational calculation and planning, since they are connected with accepting on *faith* certain standards of conduct, among other things. A distinguished student of population has described the historical influence of the growth of rationalism on the practice of family limitation as follows: There has been

. . . an increasing disposition to weigh rationally the motives and actions in ones own life. Even if all reasons for having or not having children remain the same, people in an industrialized as compared with a pre-industrial society develop the habit of

<sup>6</sup> Coogan, Thomas F.: Catholic Fertility in Florida, The Catholic University of America, *Studies in Sociology*, Vol. 20. Washington, D. C., The Catholic University Press, 1946, p. 83.

<sup>7</sup> e.g., Notestein, Frank W.: Problems of Policy in Relation to Areas of Heavy Population Pressure. *Demographic Studies of Selected Areas of Rapid Growth*. New York, The Milbank Memorial Fund, 1944.

trying to interfere rationally with the course of human events, thus giving more consideration to what these reasons are.<sup>8</sup>

Religious interest and participation may also be indications of the extent to which the individual is involved with groups and values which transcend his immediate, calculated self-interest. This is saying in another way that the individual may act with reference to his socially defined role in a larger unit rather than in terms of a deliberate calculation of alternatives. Identification with religious organizations may be considered to be inconsistent with an extreme individualism, or with separation from the traditional sanctions of group life. The conception of a sophisticated and mobile urban person, to whom nothing is sacred, who refers all questions to a narrow conception of self-interest, and to whom tradition and ritual have no value, is hardly consistent with extensive religious interest and participation. As a part of a general secularization, such an extreme urban type might be expected to plan family size, among other things. The size of family planned might also be expected to be small under the conditions of modern urban life, if the individual does not refer himself to larger groups and values.

The hypothesis may be justified also on a somewhat different basis. Non-participation in religious institutions need not necessarily involve a decrease in the control over behavior exercised by group norms. It may only involve the acceptance of norms of non-religious groups. Similarly, the "religious" person may practice contraception less frequently and may have a larger family, because these are the norms of the religious group to which he belongs rather than because of any greater adherence to social norms in general. The behavior of the person who plans his family size may differ from that of the "religious" person not because he is a "rational" and "emancipated" person but because he acts with reference to the norms of different groups. The requirements of the individual's position in the community may involve limitation of

<sup>8</sup> Myrdal, Alva: *NATION AND FAMILY*. New York: Harpers, 1942, p. 51.

family size to a certain level. These requirements may be set for him by the norms of the groups to which he belongs, whether these be religious or non-religious.

Although wider and wider areas of life have passed from the religious to the secular domain, even the most liberal religious denominations have continued to lay some stress on the sacred character of family relationships. Students of the family and of religious institutions have frequently emphasized the fact that the family as the basic reproductive unit has been less completely, and more recently, subject to the searching scrutiny of science than other human institutions. Even if we accept the view that there has been a great decrease in the proportion of families participating intensively in religious groups, it may be maintained that those participating will be most likely to accept traditional values about family practices. While many Protestant churches now advocate the practice of family limitation, and many others condone it, there are none which do not stress the value of children in family life. Furthermore, it is important to remember that most of the parents in this study grew up before acceptance of family limitation by the churches.

We have proposed two theoretical approaches to this hypothesis. The first emphasizes the loosening of group bonds and the growth of rational behavior and links these negatively with religious interest. The second emphasizes differential group membership and stresses the importance of the involvement of the "irreligious" person in groups with reproductive norms differing from those of the religious groups. The one emphasizes the method by which decisions are reached, the other emphasizes the content of the decision, assuming group determination in either case.

Serious questions may be raised about these theoretical approaches. With respect to the first, it may be argued that the "ethics of prudence and of rational calculation" have long been incorporated in Protestant religious values, either as an accommodation to or a forerunner of the requirements of a "free

enterprise" system. This is a common theme of a number of distinguished studies of the Protestant Ethic,<sup>9</sup> although there is disagreement whether such rationalism developed first in the church or in the economic system. However, a leading student of the Protestant denominations notes that the extension of rational prudence into church doctrine was associated with a strong emphasis on the sanctity of the family—at least in middle-class Protestant churches.<sup>10</sup> Whatever social units are considered to be sacred are likely to be less subject to explicit rational examination.

With respect to the second theory, at least two questions may be raised. One is the factual question of whether the norms of Protestant religious groups are those required by the hypothesis, so that participants in these groups are in contact with norms unfavorable to family limitation. Unfortunately, apart from the data of this study, we have very little reliable knowledge with which to answer this question. It is true that the Federal Council of Churches and a number of individual denominations have issued statements favorable to the practice of family limitation under certain conditions.<sup>11</sup> However, the fragmentary evidence available indicates that religious groups have come to this position relatively recently. Further, there is no doubt that they continue to stress the sanctity and significance of family life. While this emphasis is by no means inconsistent with the practice of family limitation, it is probably less likely to encourage such practice than a purely secular—if not a cynical—view. The religious view gives much greater weight to the family as an institution with values transcending the individual.

Another important question is whether even those persons

<sup>9</sup> Weber, Max: *THE PROTESTANT ETHIC AND THE SPIRIT OF CAPITALISM*. (trans. by Talcott Parsons.) New York: Scribners, 1930; Tawney, Richard, H.: *RELIGION AND THE RISE OF CAPITALISM*. New York: Harcourt Brace, 1926; Robertson, Hector, M.: *ASPECTS OF THE RISE OF ECONOMIC INDIVIDUALISM*. Cambridge: University Press, 1933.

<sup>10</sup> Niebuhr, H. Richard: *THE SOCIAL SOURCES OF DENOMINATIONALISM*. New York: Henry Holt, 1929, p. 86.

<sup>11</sup> Committee on Marriage and the Home of the Federal Council of the Churches of Christ in America: *MORAL ASPECTS OF BIRTH CONTROL*, New York, 1938.

with relatively great religious interest may not be strongly influenced in their reproductive pattern by their participation in institutions in which their roles demand behavior different from that prescribed by their religious groups. Again here, the fundamental difficulty is that our reliable knowledge of the relative social influence of the Protestant Church is so meagre that interpretation is difficult. One of the contributions of this study, incidental to its principal purpose, may be to widen our knowledge of the religious behavior of an adequate sample of Protestants in one community.

Another consideration is that part of the relationship between fertility and religious interest may run from the former to the latter. Parents may become interested in religious activities for the sake of their children. In any study, such as this one, in which degree of religious interest is reported after the fertility experience covered in the study, it is difficult to determine the direction of the influence. It is possible that the relationship may run in different directions at various stages in the history of a family.

Although the wider background and significance of the findings may be controversial, the "religious" hypothesis appears to be sufficiently plausible to justify a detailed examination of the relationship between variation in religious interest and variation in reproductive behavior.

Since there is evidence that religious interest and denomination are a function of social class membership, it is important to consider this fact in investigating the hypothesis. Kiser and Whelpton have demonstrated a marked relationship between socio-economic status and reproductive behavior for the sample of this study.<sup>12</sup> Therefore, any relationship found between religious interest and reproductive behavior may be a result of a joint relationship to socio-economic status rather than any intrinsic connection. Although the relationship found

<sup>12</sup> Kiser, Clyde V. and Whelpton, P. K.: *Social and Psychological Factors Affecting Fertility*, IX. Fertility Planning and Fertility Rates by Socio Economic Status. *Milbank Memorial Fund Quarterly*, April, 1949, xxvii, No. 2, pp. 188-244. (Reprint pp. 360-415.)



between socio-economic status and planning status is a substantial one, there remains a very considerable variation in planning status within relatively homogeneous socio-economic status groups. Explanation of the variation within formal socio-economic categories may also be a clue to the meaning of the variation between such categories. In view of these considerations, socio-economic status is used wherever possible as a control in this study.

### THE DATA

Previous reports in this series have described in detail the methods of collecting data and the nature of the data.<sup>13</sup> This report deals only with the "relatively fecund" couples. All tabulations are based on the "inflated" sample of 1,444 for this group. However, in the application of chi-square tests of significance it does not appear to be appropriate to use the inflated sample without modification, since this would underestimate the sampling error. Therefore, the procedure followed has been to test each distribution on the assumption that the proportional entries in each cell are correct but that the *numbers* in each cell should be proportionately deflated to yield a total of 860 cases—the size of the sample actually interviewed.

The categories of fertility planning status used in this study

<sup>13</sup> The following brief summary is repeated from one of the previous studies:

Briefly stated, short schedules were filled out for 41,498 native-white couples with wife under 45 in a Household Survey of Indianapolis. The Intensive Study was restricted to 2,589 native-white Protestant couples whose marriages were contracted during 1927-1929, and were unbroken at the time of the interview in 1941. Additional requirements for inclusion were: the wife was under 30 and the husband under 40 at marriage, neither had been previously married, the couple had resided in a large city most of the time since marriage, and both husband and wife had at least completed grammar school.

At the conclusion of the field work long schedules had been completed for 860 "relatively fecund" couples and briefer ones for 220 "relatively sterile" couples, a total of 1,080. The adjusted or "inflated" sample consists of 1,444 "relatively fecund" and 533 "relatively sterile" couples, a total of 1,977. Couples refusing to cooperate in the Study comprise about 11 per cent of those contacted. Despite their absence, the inflated sample is quite similar to the original universe of 2,589 eligible couples not only with respect to the distribution by number of live births but also with respect to such distributions as dwelling units by rental value and husbands and wives by age and educational attainment.

*Ibid.*, p. 192 (Reprint p. 363).



have been described in detail in previous studies of the series.<sup>14</sup>

Fifteen questions more or less directly related to the religion hypothesis were asked of each husband and wife. They may be grouped as follows:

- a. Eight questions referring directly to the religious interest or activity of the couples or their children.<sup>15</sup>
- b. Six questions intended to elicit the positive "reasons" for whatever level of religious interest the respondent professed.
- c. One question regarding religious preference.<sup>16</sup>

<sup>14</sup> The following excerpt from a previous study defines the four categories used in this study:

In general, the detailed pregnancy and contraceptive histories, including data on outcome of pregnancies and attitudes toward each pregnancy, constitute the criteria for the classifications by planning status. The categories used, in descending degree of success in planning family size, are described below.

*Number and Spacing of Pregnancies Planned.* The 408 couples in this group exhibit the most complete planning of fertility in that they had no pregnancies that were not deliberately planned by stopping contraception in order to conceive. The group consists of two major subdivisions: (a) 121 couples practicing contraception regularly and continuously and having no pregnancy, and (b) 282 couples whose every pregnancy was deliberately planned by interrupting contraception in order to conceive.

*Number Planned.* This group of 205 couples consists mainly of those whose last pregnancy was deliberately planned by stopping contraception in order to conceive but who had one or more previous pregnancies under other circumstances. Because of this, the couples are regarded as having planned the number but not the spacing of their pregnancies.

For couples not classified as "number and spacing planned" or as "number planned" the previously mentioned criteria regarding attitudes of husband and wife to each pregnancy constituted the bases for classification.

*Quasi-Planned.* This group includes 454 couples who did not deliberately plan the last pregnancy in the manner described above but who either wanted the last pregnancy or wanted another pregnancy.

*Excess Fertility.* This group is composed of 382 couples classified as least successful in planning size of family because they neither wanted the last pregnancy nor another.

*Ibid.*, p. 210-211 (Reprint pp. 381-2).

<sup>15</sup> The questions referred to in *a* and *b* are listed in the stubs of Tables 1 to 3 and in Appendix 3.

<sup>16</sup> Religious preference was reported by the wife for her husband and herself. All other religious interest items were reported separately by husband and wife. The denominational preferences are reported in Table 4.

Since the sample includes only a few cases of some of the smaller denominations, it was necessary either to omit them or to combine them into larger groups for Table 4. The latter procedure was felt to be more desirable. In grouping denominations, two principles were followed as closely as possible: (1) to combine only groups roughly similar with respect to the variables considered, (2) to combine groups roughly similar with respect to socio-economic status and the "liberal"—"fundamentalist" distinctions. It is obvious that in each grouping there is variation and none is completely homogeneous.

(Continued on page 303)

Table 1. The relation of fertility-planning status of "relatively fecund" couples to statements by wives and husbands indicating degree of religious interest.

DEGREE OF RELIGIOUS INTEREST <sup>b</sup>	PER CENT DISTRIBUTION BY PLANNING STATUS FOR STATEMENTS BY WIVES <sup>a</sup>					PER CENT DISTRIBUTION BY PLANNING STATUS FOR STATEMENTS BY HUSBANDS <sup>a</sup>				
	Total	No. and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility	Total	No. and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
ALL COUPLES	100	27.9	14.2	31.4	26.5	100	27.9	14.2	31.4	26.5
<i>Extent Last Child Encouraged by Religious Duty<sup>a</sup></i>										
Very Little	100	22.4	15.0	32.9	29.7	100	23.0	16.7	33.0	27.2
Little	100	29.6	11.9	31.3	27.2	100	24.3	14.1	31.1	30.6
Some	100	22.9	17.9	32.7	26.5	100	23.8	15.8	35.0	25.4
Much	100	21.9	17.2	31.2	29.7	100	20.0	10.0	45.6	24.4
Very Much	100	19.2	14.4	43.3	23.1	100	28.4	6.9	24.5	40.2
<i>Interest in Religion:</i>										
<i>Since Marriage</i>										
Very Little	100	38.1	5.8	23.7	32.4	100	31.6	15.3	20.4	32.7
Little	100	33.8	16.9	25.7	23.6	100	19.7	14.2	39.5	26.6
Some	100	25.0	12.9	34.0	28.1	100	28.8	13.5	32.4	25.3
Much	100	24.2	15.3	35.2	25.3	100	32.3	12.5	34.9	20.3
Very Much	100	29.5	18.7	29.1	22.7	100	23.2	17.4	31.9	27.5
<i>As a Child</i>										
Very Little	100	31.0	20.7	24.1	24.1	100	27.7	17.6	25.2	29.6
Little	100	29.3	19.6	26.1	25.0	100	29.5	10.6	33.2	26.7
Some	100	29.3	12.2	35.4	23.0	100	27.8	12.4	31.7	28.1
Much	100	28.4	12.4	28.9	30.3	100	27.7	14.7	35.1	22.4
Very Much	100	24.7	16.5	30.8	28.0	100	26.9	20.5	26.9	25.7
<i>Church Attendance as a Child</i>										
Seldom or Very Seldom	100	24.4	22.0	34.1	19.5	100	24.8	14.0	31.4	29.8
Sometimes	100	22.5	14.2	36.6	26.7	100	22.7	16.4	33.6	27.3
Often	100	29.0	12.4	28.7	29.9	100	28.0	11.6	30.0	30.4
Regularly	100	28.5	14.6	31.3	25.6	100	30.0	15.0	31.6	23.3
<i>Are Week-Day Activities All Right on Sunday Too?</i>										
Definitely Yes	100	29.4	16.1	31.4	23.1	100	27.9	15.6	26.2	30.3
Probably Yes	100	29.1	13.3	32.0	25.6	100	29.4	14.2	33.5	22.8
Doubtful	100	23.5	12.9	35.6	28.0	100	23.3	10.4	38.0	28.3
Probably No	100	23.6	12.5	32.3	31.6	100	28.4	15.9	29.7	25.9
Definitely No	100	35.4	18.2	22.7	23.8	100	30.6	15.0	30.6	23.8

<sup>a</sup> For numerical distributions see Appendix 2, Table 17. <sup>b</sup> See Appendix 3 for precise questions to which statements are replies.

<sup>c</sup> Forty-seven childless couples planning to have a child answered this question. Eighty-eight childless couples did not reply.

Three of the eight questions in *a* relate to the religious experience of the children. Since none of the children were older than fourteen at the time of the Study, it is assumed initially that their religious activity is an index of one kind of parental religious interest. The remaining five questions refer directly to the religious interest of the couples. One of these is a straightforward query about the hypothesis, asking how important a sense of religious duty was as a reason for having the last child. In an auxiliary question the respondents were asked to indicate the most important among ten reasons from which choice was possible. The alternative reasons are shown in Table 5. Although many persons will not be able to make "real" motivation explicit, reference to religious duty as a "reason" may be indicative of those for whom religious norms are of conscious concern.

The written instructions asked each respondent to answer the six questions in *b* even though religious interest was low. The intention was to differentiate those for whom reasons for religious interest were essentially secular or practical (e.g., churches provide social life) and those for whom the reasons had a sacred or theological character (e.g., religion prepares one for eternal life). An examination of the responses indicates that the respondents did not interpret this set of questions as intended. The pattern of responses suggests that these questions may have meant to the respondents: How important is each of the following functions of religion? There is a marked positive correlation between the responses on the "sacred" and on the "secular" alternatives. For example, of the 243 wives who attributed "great importance" to "churches provide social life" 90.9 per cent also attached "great importance" to "religion prepares one for eternal life." Contingency

The "Miscellaneous" grouping had already been constructed in the coding. It consists of the following denominations and sects: Spiritualist, Reformed, 2nd Reformed, Seventh Day Adventist, Dunkard, Bethel Interdenominational, Pilgrim Holiness, Christian Protestant, Swedish Mission Covenant, Unity Truth Center, Christian Disciple, Holiness League. The Moravian denomination was later added to this group. The three other combinations of denominations shown in the tables were constructed by the author on the basis of the criteria outlined above.

Table 2. The relation of fertility-planning status of "relatively fecund" couples to statements by wives and husbands about reasons for religious interest.

ANSWERS TO QUESTION: HOW IMPORTANT IS EACH OF THESE BELIEFS IN ACCOUNTING FOR YOUR INTEREST IN RELIGION OR CHURCH ACTIVITIES?	PER CENT DISTRIBUTION BY PLANNING STATUS FOR STATEMENTS BY WIVES <sup>a</sup>					PER CENT DISTRIBUTION BY PLANNING STATUS FOR STATEMENTS BY HUSBANDS <sup>a</sup>				
	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
ALL COUPLES	100	27.9	14.2	31.4	26.5	100	27.9	14.2	31.4	26.5
<i>Churches Provide Social Life</i>										
No Importance	100	40.3	8.8	24.9	26.0	100	29.3	13.6	32.1	25.0
Little Importance	100	26.8	17.4	32.4	23.4	100	22.7	16.2	32.8	28.3
Some Importance	100	28.2	16.5	29.9	25.4	100	27.5	15.4	31.2	25.9
Much Importance	100	23.7	11.2	30.9	34.2	100	32.9	12.6	31.1	23.4
Great Importance	100	23.5	12.3	39.9	24.3	100	26.5	11.3	30.9	31.3
<i>Churches are Centers of Useful Activity</i>										
No Importance	100	38.1	15.9	19.0	27.0	100	25.6	21.8	21.8	30.8
Little Importance	100	33.1	16.5	31.4	19.0	100	26.8	11.0	33.9	28.3
Some Importance	100	31.1	16.8	26.9	25.3	100	25.9	14.2	33.0	26.9
Much Importance	100	23.9	11.2	35.6	29.2	100	29.0	14.8	33.8	22.4
Great Importance	100	24.6	12.8	35.0	27.6	100	31.4	12.8	27.0	28.7
<i>Religion Helps One Lead a Better Life</i>										
No Importance	100	36.4	18.2	36.4	9.1	100	34.6	23.1	25.0	17.3
Little Importance	100	47.4	18.4	21.1	13.2	100	29.3	9.8	23.9	37.0
Some Importance	100	34.6	13.4	25.8	26.3	100	26.3	17.1	27.3	29.4
Much Importance	100	26.7	11.5	32.6	29.1	100	27.6	10.5	37.8	24.1
Great Importance	100	25.5	15.4	32.8	26.4	100	27.9	15.3	30.9	25.9
<i>Religion Brings Fellowship with God</i>										
No Importance	100	51.9	7.4	33.4	7.4	100	36.8	18.4	21.1	23.7
Little Importance	100	18.5	48.2	29.6	3.7	100	47.1	1.4	25.0	26.5
Some Importance	100	36.0	13.5	28.6	21.9	100	24.3	16.8	29.3	29.6
Much Importance	100	29.7	9.0	33.8	27.5	100	27.8	10.9	36.4	24.9
Great Importance	100	24.8	15.8	31.0	28.4	100	27.1	16.1	30.6	26.2
<i>Religion Prepares One for Eternal Life</i>										
No Importance	100	41.9	14.0	27.9	16.3	100	39.3	15.2	20.5	25.0
Little Importance	100	32.1	30.4	19.6	17.9	100	32.4	14.8	25.9	26.9
Some Importance	100	32.8	14.4	28.9	23.9	100	27.4	9.0	32.2	28.1
Much Importance	100	31.4	6.8	34.8	26.9	100	26.0	12.2	42.2	22.7
Great Importance	100	24.6	15.4	32.0	28.0	100	26.4	16.9	29.5	27.3
<i>Religion Helps Build a Better World</i>										
No Importance	<sup>b</sup>	...	...	...	...	100	41.9	9.7	19.4	29.0
Little Importance	<sup>b</sup>	...	...	...	...	100	23.1	10.3	33.3	33.3
Some Importance	100	36.4	16.4	24.5	22.7	100	26.1	14.4	27.7	31.9
Much Importance	100	31.5	6.9	31.5	30.1	100	29.3	12.9	33.2	24.6
Great Importance	100	26.4	15.2	32.3	26.1	100	27.6	14.9	32.0	25.5

<sup>a</sup> For numerical distributions see Appendix 2, Table 18.

<sup>b</sup> Percentages not computed for total less than 20.

coefficients for the relationship between importance attached to two "secular" reasons ("churches provide social life" and

Table 3. The relation of fertility-planning status of "relatively fecund" couples to statements by wives and husbands about religious experience of their children.

AMOUNT OF RELIGIOUS EXPERIENCE OF CHILDREN <sup>b</sup>	PER CENT DISTRIBUTION BY PLANNING STATUS <sup>a</sup>				
	Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
ALL COUPLES WITH CHILDREN: <sup>c</sup>	100	21.1	15.4	34.4	29.0
<i>Wives</i>					
<i>Frequency Children Have:</i>					
<i>Attended Church or Sunday</i>					
<i>School?</i>					
Seldom	100	16.2	12.4	39.0	32.4
Fairly Often	100	22.0	13.9	33.8	30.4
Regularly	100	21.3	17.0	34.2	27.5
<i>Said Prayers at Bedtime?</i>					
Seldom	100	15.8	17.7	28.5	38.1
Fairly Often	100	20.9	13.6	37.6	27.9
Regularly	100	23.9	16.1	34.1	25.9
<i>Heard Grace at Meals?</i>					
Seldom	100	22.3	14.6	33.6	29.5
Fairly Often	100	15.2	16.5	36.3	32.0
Regularly	100	24.3	16.0	34.2	25.6
<i>Husbands</i>					
<i>Frequency Children Have:</i>					
<i>Attended Church or Sunday</i>					
<i>School?</i>					
Seldom	100	22.8	16.9	30.1	30.1
Fairly Often	100	18.0	13.1	35.8	33.0
Regularly	100	23.8	17.2	34.0	25.0
<i>Said Prayers at Bedtime?</i>					
Seldom	100	18.4	15.7	34.4	31.5
Fairly Often	100	17.7	15.2	34.5	32.7
Regularly	100	27.9	15.1	34.4	22.6
<i>Heard Grace at Meals?</i>					
Seldom	100	21.7	15.3	32.7	30.4
Fairly Often	100	20.2	13.8	35.9	30.1
Regularly	100	20.9	17.4	37.6	24.0

<sup>a</sup> For numerical distributions, see Appendix 2, Table 19.

<sup>b</sup> The exact question asked was "How often have your children (or how often will they later, if too young now) attended church or Sunday School?" etc.

<sup>c</sup> Only couples with children responded to these questions.

Table 4. The relation of fertility-planning status and births per 100 "relatively fecund" couples to religious denomination of wives and husbands.

RELIGIOUS DENOMINATION	PER CENT DISTRIBUTION BY PLANNING STATUS <sup>a</sup>					BIRTHS PER 100 COUPLES
	Total	No. and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility	
ALL COUPLES	100	27.9	14.2	31.4	26.5	203
<i>Denomination of Wife:</i>						
Congregational, Episcopal, Unitarian, Friends, Universalist <sup>b</sup>	100	28.6	16.6	38.1	16.6	195
Christian Science	100	38.8	...	30.6	30.6	161
Presbyterian	100	38.4	16.4	30.1	15.1	171
Lutheran	100	34.6	12.8	30.8	21.8	194
Christian	100	24.8	19.4	33.5	22.3	201
Methodist	100	21.3	9.5	40.9	28.3	214
Evangelical, Evangelical- Reformed, Evangelical- Zion <sup>b</sup>	100	35.8	26.4	17.0	20.8	170
Baptist	100	22.3	18.1	22.9	36.7	201
United Brethren	100	20.0	...	43.3	36.7	227
Church of Christ, Church of God, Church of 1st Born, Nazarene, Pentecostal <sup>b</sup>	100	11.9	15.2	30.5	42.4	297
Miscellaneous <sup>b</sup>	100	32.4	21.6	24.3	21.6	195
Unknown, but Protestant	100	39.5	10.5	18.6	31.4	210
None <sup>c</sup>	100	46.3	14.9	17.9	20.9	202
<i>Denomination of Husband:</i>						
Congregational, Episcopal, Unitarian, Friends, Universalist <sup>b</sup>	100	11.9	19.0	50.0	19.1	214
Christian Science	100	37.5	...	45.0	17.5	155
Presbyterian	100	38.6	20.0	26.4	15.0	185
Lutheran	100	39.1	11.6	29.0	20.3	200
Christian	100	21.6	19.6	35.9	22.9	204
Methodist	100	24.3	12.0	37.4	26.3	204
Evangelical, Evangelical- Reformed, Evangelical- Zion <sup>b</sup>	100	42.0	16.0	18.0	24.0	186
Baptist	100	25.0	17.1	25.0	32.9	199
United Brethren	100	...	8.3	50.0	41.7	262
Church of Christ, Church of God, Church of 1st Born, Nazarene, Pentecostal <sup>b</sup>	100	17.1	12.2	29.3	41.4	315
Miscellaneous <sup>b</sup>	100	31.8	20.4	22.7	25.0	209
Unknown, but Protestant	100	35.3	10.8	18.6	35.3	224
None <sup>c</sup>	100	33.6	6.6	26.2	33.6	178

<sup>a</sup> For numerical distributions, see Appendix 2, Table 20.

<sup>b</sup> See footnote 16 for explanation of these groupings and categories.

<sup>c</sup> Protestants without specific denominational preference.



"churches are the center of useful activity") and two "sacred" reasons ("religion brings fellowship with God" and "religion prepares one for eternal life") range from .38 to .49.<sup>17</sup> In view of these findings, the answers to these six questions have been treated as indices of religious interest. Attaching "great importance" to any of the reasons has been considered as indicating great religious interest.

The denomination given by the respondent in reply to the question on religious preference is no evidence of active membership, but probably indicates the religious group to which the respondent feels the most affinity. The meaning to attribute to preferences for different religious denominations is a difficult question which will be discussed more fully at a later point. The assumption has been made in this study that the denominations with a "liberal" theology in which the area of "reason" is maximized and emotional demonstrations minimized are also the denominations which in general have condoned or encouraged family limitation. According to the rationale for our hypothesis, affiliation with these "liberal" denominations should have an effect similar to a low degree of religious interest in increasing the practice of family limitation.

The validity of the data on religious behavior is difficult to establish. It is probably true that some of the responses reflect what are considered to be conventional or "correct" answers. One partial check is available in the independent responses of husbands and wives to the question: "How often have your children (or how often will they, later, if too young now): (1) attended church or Sunday School? (2) said prayers at bed-time? (3) heard grace at meals?" For each of these three items a higher number of wives than husbands answered "regularly," as may be seen from a comparison of the "total" columns in Table 3. Unfortunately, even these data are not a perfect check, since the husband-wife discrepancy may have arisen from differences in expectations of husbands and wives about the behavior of children "too young now."

<sup>17</sup> See Appendix 1 for a tabulation of the coefficients.



Table 5. The relation of fertility-planning status of "relatively fecund" couples to reason rated by wives and husbands as most important for having last child.

REASON RATED AS MOST IMPORTANT	Total Number	PER CENT DISTRIBUTION BY PLANNING STATUS				
		Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
<b>ALL WIVES:<sup>a</sup></b>	1,354	100	23.8	15.1	33.3	27.8
A Strong Liking for Children	667	100	27.0	13.8	34.5	24.7
A Belief that it is a Religious Duty to Have a Family	30	100	6.7	10.0	40.0	43.3
The Traditional Belief that Married Couples Ought to Have Children	123	100	13.8	8.9	30.9	46.4
A Feeling that it is Important to Carry on the Family Name	8	b	...	...	...	...
A Desire to See What Own Children Would be Like	68	100	42.6	7.4	23.5	26.5
A Feeling that Children Bring Husband and Wife Closer Together	147	100	23.1	12.9	34.0	30.0
Not Wanting an Only Child	167	100	20.4	25.7	35.3	18.6
Not to be Left Childless in Case of Death of Only Child	14	b	...	...	...	...
The Desire of Children for More Brothers and Sisters	32	100	18.8	25.0	37.5	18.7
Wanting a Girl if Only Had Boys, or a Boy if Only Had Girls	71	100	12.7	21.1	26.8	39.4
Unknown	27	100	7.4	11.1	33.3	48.2
<b>ALL HUSBANDS:<sup>a</sup></b>	1,357	100	23.6	15.2	33.6	27.6
A Strong Liking for Children	593	100	30.0	13.5	34.1	22.4
A Belief that it is a Religious Duty to Have a Family	47	100	23.4	14.9	25.5	36.2
The Traditional Belief that Married Couples Ought to Have Children	124	100	18.5	8.9	37.9	34.7
A Feeling that it is Important to Carry on the Family Name	29	100	41.4	...	17.2	41.4
A Desire to See What Own Children Would be Like	47	100	29.8	6.4	40.4	23.4
A Feeling that Children Bring Husband and Wife Closer Together	244	100	16.0	16.8	37.7	29.5
Not Wanting an Only Child	131	100	21.4	35.1	25.2	18.3
Not to be Left Childless in Case of Death of Only Child	5	b	...	...	...	...
The Desire of Children for More Brothers and Sisters	21	100	23.8	4.8	28.6	42.8
Wanting a Girl if Only Had Boys, or a Boy if Only Had Girls	75	100	1.3	14.7	32.0	52.0
Unknown	41	100	22.0	7.3	24.4	46.3

<sup>a</sup> Includes responses for all couples who had a live birth and all childless couples with wife pregnant at interview or respondent indicating couple intended to have a child in future. Forty-five childless couples are included on basis of response of wife and 48 on basis of response of husband.

<sup>b</sup> Percentages not computed for total less than 20.

The data on other questions consistently show a greater amount of religious interest and participation for wives than for husbands. It is impossible to determine whether this indicates a genuinely greater religious interest on the part of the wives or a stronger feeling that answers showing interest in religion are socially expected. In any case, it might be argued that a deference to social expectation is exactly the kind of traditionalism which is one basis for expecting religious interest to affect reproductive behavior.

The religious data are very complete for each person in the sample, in the sense that there are very few cases of "unknown" responses to religious interest items. There are only three tabulations, among the many presented in this paper, for which the "unknown" responses number more than three. Therefore, except for these three tabulations, the "unknowns" are not shown as separate categories, although they are included in the "total" in each case.

#### THE RELATIONSHIP BETWEEN RELIGIOUS INTEREST AND THE PLANNING OF FERTILITY

For the sample as a whole, the data show a small but fairly consistent relationship between the various indices of religious interest and the effective planning of fertility. However, these relationships are largely a function of the socio-economic status of the respondents. The relationship is most marked for religious preference. This is a much simplified summary of the findings we present now in detail.

Tables 1 to 4 show separately for husbands and wives the relationship between each of the 15 indices of religious interest and the effectiveness of planning of fertility. The relationship shown in these tables is rarely large enough to obtain regular gradations of effectiveness of planning as one moves from low-religious-interest to high-religious-interest categories. However, a fair consistency appears if only the extreme categories of religious interest are used in each case. If we consider only the data in Tables 1-3 (excluding religious denomination for

the moment), the categories reflecting "lowest" religious interest contain a higher percentage of "effective planners"<sup>18</sup> than the categories reflecting the "highest" degree of religious interest, for 9 out of 14 comparisons for wife and 8 out of 14 comparisons for husbands. If we add religious denomination to this comparison, (Table 4) comparisons are consistent 10 out of 15 times for wife and 9 out of 15 times for husbands. For responses of both husbands and wives 3 of the 5 comparisons inconsistent with the hypothesis are for the questions on religious behavior of their children. We will see later that this inconsistency is a function of the socio-economic status of the parents. If we set aside for the moment the three questions about the children, the comparisons are consistent with the hypothesis in 10 out of 12 cases for wife and 9 out of 12 cases for husbands.

Essentially the same results are obtained if extreme categories are compared with respect to per cent of families classified as "number and spacing planned." In this case the comparisons are consistent with the hypothesis for 10 out of 15 items for the wife and 9 out of 15 for husband. Three of the inconsistencies for wives and two of those for husbands are for the questions on the religious behavior of the children. If the questions on religious behavior of children are omitted, the comparisons are consistent with the hypotheses in 9 of 12 cases for wives and 8 of 12 cases for husbands.

The comparisons are most consistent with the hypothesis for the group of six items on "reasons" for importance of religion (see Table 2). For each of the six items, for responses of either husbands or wives, the comparisons of extreme categories on percentage of "effective planners" are consistent with the hypothesis. Similarly, when the extreme categories on these items are compared on percentage of couples classified as "number and spacing planned," the comparisons are consistent with the

<sup>18</sup> The term "effective planners" is used in this, as in preceeding studies of the series, to refer to couples whose planning status was either "number and spacing planned" or "number planned." The *number* of children is completely planned for the couples in both of these categories.

hypothesis for each of the six items for wives and for five of the six items for husbands. Thus, the reasons for importance of religion are more consistently related to planning status than are other measures indicating personal interest in religion or reporting on religious activities. However, this difference should not be over emphasized, since the relationship is not large in either case.

Chi-square values were compared to test the significance of each of the relationships in Tables 1-4. Very few are significantly greater than might be expected to occur by chance alone. The level at which chi square is significant for each item is given in Appendix 4. For fifteen items for which chi-square measures were computed, five show relationships significant at the .05 level for the responses of wives but only two show a relationship significant at this level for husbands. For both husbands and wives one of these "significant" relationships is in a direction opposite to the hypothesis. (There is a significant *positive* relationship between the frequency with which children say prayers at bed-time and the effectiveness of planning fertility.) Therefore, there remain four items for responses of wives and one for responses of husbands in which there are statistically significant relationships consistent with the hypothesis. The relationship of religious denomination and planning status is significant at the .001 level for either husbands or wives. For wives, the other three statistically significant relationships consistent with the hypothesis are for three of the reasons which they gave for the importance of religion.<sup>19</sup>

As indicated by the data in Table 4, as well as by the chi-square values, the most marked relationship is that between religious denomination and planning status. These data are difficult to interpret with any precision, because it is difficult to classify the religious denominations precisely either with reference to their general emphasis on the rational examination of

<sup>19</sup> Churches provide social life; Religion brings fellowship with God; Religion prepares one for eternal life.

traditional values or their specific pronouncements on the issues of family planning. Very roughly, there does seem to be a tendency for the religious groups with a relatively high percentage of effective planners to be those generally regarded as "liberal" or those in which the "prudent" elements of the "Protestant Ethic" are very strong (e.g., the Presbyterians and the Lutherans). The denominations with a low percentage of "effective planners" appear to be mainly those with a "fundamentalist" approach to religion and a more emotional emphasis on faith. This is certainly a very crude statement, subject to many qualifications. The fundamental difficulty in interpretation is that American Protestant denominations have no binding central creed which persists over time and in different places.

As between responses of husbands and wives, the findings for religious denominations are relatively consistent. If the ten religious denomination groups are ranked on the basis of the percentage of effective planners, the rankings based on responses of husbands and wives differ by more than one rank in only two cases.

We have seen that planning status is more closely related to religious denomination than to the specific religious interest items. This may result from the fact that the religious interest items represent variable statements of subjective attitudes, while the religious denominations represent objective historic groups whose common membership is characterized by a variety of selective factors possibly related to reproductive behavior. Similar statements of attitudes may arise out of a variety of different group connections. Common denominational affiliation is an indication of at least one common group membership. It probably is more likely to indicate interactions among the persons involved than is a common statement of attitudes. A number of students of religious organization indicate that the denominations have social origins and are linked to other distinctive groupings in society. To the extent that this is true, differing reproductive behavior for members of different

denominations may reflect the requirements of other groups related to the denominations.

Another type of evidence is contained in Table 5. This shows the results of asking the husband and wife which of ten listed reasons was most important to them in the decision to have their last child. (The responses of childless couples were tabulated also, if the couple indicated an intention to have a child or if the wife was pregnant at interview.) The number indicating "a belief that it is a religious duty to have a family" as reason for last child is small for both husbands and wives (thirty for wives and forty-seven for husbands). Explicit religious considerations are clearly not a widespread conscious motivation for having children in the stage of family growth represented by our sample. In frequency of mention as the "most important reason," religious duty ranks eighth among the ten possible reasons of wives and is tied for sixth with another reason among the ten for husbands.<sup>20</sup> Considering only those who gave this reason, the results vary with whether responses of husbands or wives are considered. Among couples for which wives gave "religious duty" as the most important reason, there is a very low percentage of "effective planners." However, among couples for which husbands gave this answer, the percentage of "effective planners" is only slightly below the corresponding percentage for all couples.

In interpreting these data, it is important to note that the importance attached to "reasons" for having the last child may not have been the same at various stages of growth of particular families. A "reason" considered as unimportant for the last child may have been important for an earlier birth. Conversely, a reason unimportant in an earlier birth may become important because of the nature of the earlier births (e.g. sex of child). Thus, parents who believe that it is a religious duty to have children may have felt that this duty was

<sup>20</sup> In Flanagan's study of the families of Air Corps officers 51 out of 427 officers and 53 of 320 wives reporting indicated that "religious obligation" was of "some," "much," or "great" importance as a reason for having children. Flanagan, *op cit.*, p. 28.



fulfilled prior to the last child. This might account partially for the relatively high percentage of wives who were in the "excess fertility" group among those who answered "little" or "very little" to the question on importance of religious duty as the reason for the last child. (See Table 1.)

A rough index of religious interest for the couple was constructed by adding the codes for five of the religious interest items for husbands and wives. These items were: religious interest as a child, religious interest since marriage, church attendance as a child, "useful activities" as a reason for importance of religion, and "fellowship with God" as a reason for importance of religion.<sup>21</sup> Since the individual codes ranged

Table 6. The relation of fertility-planning status and births per 100 "relatively fecund" couples to religious interest index.

RELIGIOUS INTEREST INDEX	PER CENT DISTRIBUTION BY PLANNING STATUS <sup>a</sup>				
	Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
ALL COUPLES	100	27.9	14.2	31.4	26.5
Below 40	100	28.1	21.9	31.2	18.8
40-49	100	51.1	10.5	10.5	27.9
50-59	100	24.7	13.7	33.1	28.4
60-69	100	28.7	12.2	32.9	26.2
70-79	100	22.9	17.6	33.2	26.3
80 and Over	100	31.8	14.5	30.0	23.6
BIRTHS PER 100 COUPLES <sup>a</sup>					
ALL COUPLES	203	106	228	199	296
Below 40	188	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>
40-69	194	97	208	189	297
70 and Over	222	132	255	221	290

<sup>a</sup> See Appendix 2, Table 21 for numerical distributions.

<sup>b</sup> Rates not computed for less than 20 cases.

<sup>21</sup> Of the original fourteen religious interest items, four were excluded because they refer most directly to couples with children and many childless couples did not answer them. Of the six items referring to reasons for religious interest, only two were selected for the index, since it is desirable not to overweight the index with this one type of item. The two "reasons" included are at opposite extremes on the sacred-secular continuum. In addition to the index reported here, separate indices

(Continued on page 315)

from 1 to 9 on these items, the possible range of the resulting Religious Interest Index for each couple was 10 to 90.

The relationship of this Index to extent of planning fertility is shown in Table 6.<sup>22</sup> The group with the lowest Religious Interest Index has a higher percentage of "effective planners" and a lower percentage of "excess fertility" families than the group with the highest Religious Interest Index. However, the relationship is not consistent for intermediate categories. Moreover, when percentage of families "number and spacing planned" is considered, the pattern is even less consistent.

Another type of evidence was obtained by selecting two groups of couples on the basis of answers to two or three of the religious interest items. An extreme group of "very low religious interest" consists of those who answered "little" or "very little" to both of the following questions:

How much have you been interested in religion since marriage?

How much were you interested in religion when you were 10-15 years old?

An extreme group of "very high religious interest" consists of those with "very much interest in religion since marriage," attributing very much importance to "preparation for eternal life" as the basis for their interest in religion, and belonging to one of the extreme fundamentalist or evangelistic religious denominations. Since the number of husbands whose responses placed them in this category was small, the comparison was based on responses of wives only. Table 7 shows that the results of the comparison between the "low" and "high" groups are very clearly consistent with the hypothesis. Fifty-six per cent of the "very low religious interest" group were "effective planners" as compared with 32 per cent of the "very high religious interest group."

were constructed for husbands and wives based on the same five items used for the index for the couple. The separate indices for the husband and wife were combined by cross-classification to provide another type of index for the couple. None of these indices were related to fertility planning and fertility more consistently than the index reported in the body of the paper.

<sup>22</sup> The chi square value for this table shows a relationship not significant at the .05 level.

MULTIPLE RELIGIOUS INTEREST CLASSIFICATION	NUMBER OF COUPLES	PER CENT DISTRIBUTION BY PLANNING STATUS				
		Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fer- tility
Very Little Religious Interest	64	100	39.1	17.2	20.3	23.4
Very High Religious Interest	41	100	17.1	14.6	34.1	34.2

Table 7. Relation of fertility-planning status of "relatively fecund" couples to multiple religious interest classification of wife.

The small gross relationships found for the sample as a whole are largely a function of socio-economic status. A detailed analysis of the relationship *within* socio-economic groups does not indicate a consistent pattern for most of the items. Religious denomination is the only individual item for which an analysis within socio-economic categories shows some consistency of relationship to planning status.

For the purpose of this analysis, the Index of Socio-Economic-Status, developed by Kiser and Whelpton,<sup>23</sup> was used. This index is a simple summation of the ratings of each couple on a 8, 9, or 10 point code for each of the following eight items: husband's average annual earnings since marriage, net worth, shelter rent at interview, husband's longest occupational class since marriage, purchase price of car, education of husband, education of wife, and rating of the household on Chapin's Social Status Scale. A low score on the index indicates a high socio-economic status and *vice versa*. With the code numbers used a couple could receive any score from 1 to 72. The actual range of variation extended from 1 to 69. Kiser and Whelpton found that five groupings of the sample based on the Index of Socio-Economic Status serve to differentiate the couples with respect to planning status and fertility very well as compared with any of the conventional individual items.

Let us consider first the fourteen religious items in Tables 1-3. The relationship between each of these religious interest

<sup>23</sup> *Op. Cit.*, pp. 214, 216. (Reprint pp. 385, 387).

indices and planning status was found separately for each of five socio-economic status subgroups. Table 23, Appendix 5 contains a sample set of data for the relationship between one of these indices and planning status, subclassified into the five socio-economic status groups. Similar tabulations were made for each item, separately for husband and wife. These tabulations yielded seventy sets of data (considering the relationship separately for each of the fourteen items for each socio-economic status) for which the relationship could be examined. A study of these tables did not indicate any regular pattern. As a minimum test of the hypothesis, the "extreme" categories of the religious interest items were compared with respect to the percentage of couples in each group who were "effective planners."<sup>24</sup> In such comparisons, it was found that categories reflecting a "low" degree of religious interest have a higher percentage of "effective planners" than categories reflecting a "high" degree of religious interest, as follows:

in thirty-eight out of seventy comparisons based on responses of wives to religious interest items.

in twenty-seven out of seventy comparisons based on responses of husbands to religious interest items.

As between the five socio-economic status groups, the middle group (30-39) has the highest number of comparisons consistent with the hypothesis, for both husbands and wives: twelve of the fourteen comparisons based on the responses of the wives and nine of the fourteen comparisons based on the responses of the husbands. Thus, the only set of relationships fairly consistent with the hypothesis, even at a minimum involving extremes, is that for planning status and the religious interest of the middle socio-economic status group of wives. This group is probably fairly close to being of a middle class

<sup>24</sup> In these comparisons within socio-economic status groups, response categories were combined for most items into three or four categories, to increase the size of the base for percentages. The combinations used are consistent for socio-economic status groups within each item. Percentages were not computed for a base of less than twenty cases. Comparisons were made between the extreme response categories having at least twenty couples in each.

character, even though some of the lower class couples were excluded from the study by the definition of the sample.

For only one individual item (churches are the center of useful activities) for wives is the comparison consistent with the hypothesis in each of the five socio-economic status groups at the minimum level considered.

The religious interest items appear to be more closely related to socio-economic status than to planning status. Contingency coefficients were computed<sup>25</sup> for the relationship between the Index of Socio-Economic Status and each of fourteen religious interest items, separately for responses of husbands and wives. The resulting twenty-eight contingency coefficients were small. However, of the twenty-eight, twenty-three were higher than the comparable contingency coefficients for the relationship between the religious interest item and planning status. Further, planning status is more closely related to socio-economic status than to any of the specific religious interest variables. The relationship between socio-economic status and planning status is shown in Table 8.

Within the socio-economic status groups the high category

Table 8. The relation of fertility-planning status of "relatively fecund" couples to the index of socio-economic status.<sup>a</sup>

INDEX OF SOCIO-ECONOMIC STATUS	NUMBER OF COUPLES	PER CENT DISTRIBUTION BY PLANNING STATUS				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
ALL COUPLES	1,444	100	27.9	14.2	31.4	26.5
0-19	224	100	48.7	14.7	24.6	12.1
20-29	243	100	39.1	18.5	30.9	11.5
30-39	323	100	25.4	13.0	38.1	23.5
40-49	403	100	21.8	11.2	32.5	34.5
50 and over	251	100	11.6	15.9	27.9	44.6

<sup>a</sup> Adapted from Kiser and Whelpton. *Op. cit.* p. 220 (Reprint p. 392).

<sup>25</sup> Each of the fourteen religious interest items was correlated separately with socio-economic status and with planning status. The computations for each of these pairs of contingency coefficients were based on classifications of the data into comparable table forms. Comparisons between religious interest items are not exactly comparable on this basis. The contingency coefficients varied from .08 to .26 for the relationship of religious interest items to socio-economic status and from .07 to .16 for the relationship of religious interest items to planning status.

Table 9. The relation of religious denomination of wives and husbands to the index of socio-economic status.

RELIGIOUS DENOMINATION	PER CENT DISTRIBUTION BY INDEX OF SOCIO-ECONOMIC STATUS					
	Total	0-19	20-29	30-39	40-49	50 & Over
ALL COUPLES	100	15.5	16.8	22.4	27.9	17.4
<i>Denomination of Wife:</i>						
Congregational, Episcopal, Unitarian, Friends, Universalist <sup>a</sup>	100	61.9	14.4	9.5	7.1	7.1
Christian Science	100	24.5	14.3	26.5	34.7	...
Presbyterian	100	38.4	29.4	12.3	14.4	5.5
Lutheran	100	17.9	23.1	23.1	26.9	9.0
Christian	100	7.9	14.9	26.4	31.4	19.4
Methodist	100	13.7	13.6	26.2	31.9	14.6
Evangelical, Evangelical-Reformed, Evangelical-Zion <sup>a</sup>	100	...	13.3	23.4	23.3	40.0
Baptist	100	7.5	30.2	34.0	18.9	9.4
United Brethren	100	5.4	10.8	24.7	33.8	25.3
Church of Christ, Church of God, Church of 1st Born, Nazarene, Pentecostal <sup>a</sup>	100	3.4	1.7	11.9	38.9	44.1
Miscellaneous <sup>a</sup>	100	5.4	18.9	27.0	27.0	21.6
Unknown, but Protestant	100	18.6	19.8	11.6	24.4	25.6
None <sup>b</sup>	100	16.4	25.4	16.4	20.9	20.9
<i>Denomination of Husband:</i>						
Congregational, Episcopal, Unitarian, Friends, Universalist <sup>a</sup>	100	35.7	26.2	11.9	16.7	9.5
Christian Science	100	22.5	17.5	35.0	25.0	...
Presbyterian	100	35.7	25.0	15.7	17.8	5.7
Lutheran	100	13.0	23.2	26.1	27.5	10.1
Christian	100	10.6	15.1	26.5	31.4	16.3
Methodist	100	16.8	13.7	27.1	26.0	16.5
Evangelical, Evangelical-Reformed, Evangelical-Zion <sup>a</sup>	100	8.0	32.0	24.0	26.0	10.0
Baptist	100	5.9	11.2	23.7	36.2	23.0
United Brethren	100	...	20.8	29.2	20.8	29.2
Church of Christ, Church of God, Church of 1st Born, Nazarene, Pentecostal <sup>a</sup>	100	...	2.4	2.4	48.8	46.3
Miscellaneous <sup>a</sup>	100	18.2	20.4	22.7	27.3	11.4
Unknown, but Protestant	100	13.7	20.6	12.7	21.6	31.4
None <sup>b</sup>	100	14.6	13.9	16.8	32.8	21.9

<sup>a</sup> See footnote 16 for explanation of these groupings and categories.

<sup>b</sup> Protestants without specific denominational preference.



on the Religious Interest Index, previously described, has a higher percentage of "effective planners" than the low category in four out of five cases.<sup>26</sup> However, for none of these four socio-economic status groups considered separately is the relationship statistically significant (as measured by chi square). The intermediate Religious Interest Index categories do not have an intermediate position on percentage of "effective planners" with any consistency.

It is not possible to study the relationship between religious denomination and planning status separately for each of the 5 socio-economic status groups, since the numbers involved in individual denominations are relatively small. Yet, the importance of considering the effect of socio-economic status on this relationship may be seen in Table 9, which shows a marked variation in the distribution by socio-economic status for the various denominations.

One approach to the problem was made by considering the two denominations having the largest numbers in the sample: the Methodist and the Christian. For each of these groups separately it is possible to consider the relationship between socio-economic status and planning status. If common denominational affiliation makes for homogeneity in planning status, then the relationship between socio-economic status and planning status should be small within each of these religious groups—at least, it should be less marked than for the sample as a whole. This does not appear to be the case. Table 10 shows that there is a marked relationship of planning status and socio-economic status for each of these two denominations. The contingency coefficients for the relationships are .41 and .38, for Methodist husbands and wives respectively. The contingency coefficients for the Christians are .34 for both husbands and wives. These are larger than the corresponding coefficient of .32 for the whole sample.<sup>27</sup>

<sup>26</sup> The direction of the difference is reversed in the 20-29 socio-economic status group.

<sup>27</sup> These contingency coefficients were computed for 4 by 4 tables with the 0-19 and 20-29 socio-economic status categories combined.

Table 10. The relation of fertility-planning status to the index of socioeconomic status, for Methodists and Christians: wives and husbands.

SOCIO-ECONOMIC STATUS AND RELI- GIOUS DENOMINATION	TOTAL NUMBER	PER CENT DISTRIBUTION BY PLANNING STATUS				
		Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fer- tility
ALL COUPLES	1,444	100	27.9	14.2	31.4	26.5
<i>Couples with Meth- odist Wife Socio- Economic Status</i>						
Total	389	100	21.3	9.5	40.9	28.3
0-19	53	100	49.1	5.7	35.8	9.4
20-29	53	100	24.5	22.6	37.7	15.1
30-39	102	100	13.7	3.9	54.9	27.4
40-49	124	100	19.4	7.2	38.7	34.7
50 and Over	57	100	10.5	15.8	28.1	45.6
<i>Couples with Chris- tian Wife Socio- Economic Status</i>						
Total	242	100	24.8	19.4	33.5	22.3
0-19	19	*	...	...	...	...
20-29	36	100	36.1	36.1	27.8	...
30-39	64	100	32.8	23.4	31.2	12.5
40-49	76	100	17.1	13.2	39.5	30.3
50 and Over	47	100	10.6	14.9	36.2	38.3
<i>Couples with Meth- odist Husband Socio-Economic Status</i>						
Total	358	100	24.3	12.0	37.4	26.3
0-19	60	100	53.3	8.3	25.0	13.3
20-29	49	100	26.5	24.5	34.7	14.3
30-39	97	100	14.4	6.2	57.7	21.6
40-49	93	100	21.5	11.8	33.3	33.3
50 and Over	59	100	13.6	15.2	25.4	45.8
<i>Couples with Chris- tian Husband Socio-Economic Status</i>						
Total	245	100	21.6	19.6	35.9	22.9
0-19	26	100	34.6	15.4	23.1	26.9
20-29	37	100	32.4	37.8	24.3	5.4
30-39	65	100	29.2	21.5	33.8	15.4
40-49	77	100	11.7	12.9	40.2	35.1
50 and Over	40	100	10.0	15.0	50.0	25.0

\* Percentages not computed for total less than 20.

Another approach to the problem was made for the sample as a whole, by classifying the religious denominations as "Low," "Middle," and "High" planners on the basis of the percentage of "effective planners" in each group.<sup>28</sup> The persons classified as "none" or "unknown" on religious denomination were combined into a separate fourth group. The four groups were large enough to permit subclassification by the five socio-economic status groups. The objective was to determine whether the religious groups having a relatively low percentage of "effective planners" for the sample as a whole have also a relatively low percentage of effective planners within each of the five socio-economic status groups. Although there is much erratic fluctuation, involving the "middle" and "none or unknown groups," it is true that the "high" planning group has a higher percentage of "effective planners" than the "low" planning group in each of the five socio-economic status groups, regardless of whether the classification is made on the basis of the religious affiliation of the wife or of the husband. This fact may indicate that if there were larger samples for each of the denominations, it might be found that the relationship between denomination and planning status is not wholly a function of socio-economic status. However, the results of this analysis are inconclusive. They are not consistent with the previous findings for the two largest denominations.

We have already seen that the relationship between the indices of religious activity of the children and the planning status of the parents is positive—a deviation from the hypothesis and from the other relationships for the sample as a whole. In general, the data show a small *positive* relationship between socio-economic status and the religious activity of the children. This explains the anomaly in part, since only these items on religious activity of children show a positive relationship to socio-economic status. The positive relationship between planning status and religious activity of children is not consistent within socio-economic categories. The religious activity of the

<sup>28</sup> See Appendix 6 for the denominations in each classification.

children may have a status-giving rather than a *religious* function for the parents, since it is inconsistent with any direct measures of the religious interest and activities of the parents.

#### THE RELATIONSHIP BETWEEN RELIGIOUS INTEREST AND FERTILITY

The second part of the hypothesis is: "the greater the interest in religion the larger the planned families." This part of the hypothesis may be valid, even if the effectiveness of fertility planning is not related to religious interest. For religious persons who plan, it may be that religious interest helps to determine the goal of family size to which the planning is directed. While the use of rational means may not be related to religious interest, it is quite possible that the ends of planning may be.

Tables 11-14 show the fertility rates by various measures of religious interest and participation. (Religious denomination and the Religious Interest Index will be treated separately.) The rates represent number of live births per 100 couples and have been computed separately for the sample as a whole and for each of the four planning status groups. There are separate sets of rates based on responses of husbands and wives.

The pattern of fertility rates tends to be consistent with the hypothesis, if the extreme religious interest categories are used for comparison. The relationship is not close enough to provide a systematic increase in fertility rates in the progression from the lowest to the highest religious interest categories in each case. However, for the sample as a whole, the "highest" religious interest category has a higher fertility rate than the "lowest" religious interest category for thirteen out of fourteen items on the basis of responses of wives and eleven out of fourteen items on the basis of responses of husbands.

Since there are fourteen items and four planning status categories, there are fifty-six possible comparisons of fertility rates for "highest" and "lowest" religious interest categories. On the basis of the responses of the wives forty-six of the fifty-six

Table 11. Births per 100 couples by fertility-planning status and by statements of wives and husbands indicating degree of religious interest.

DEGREE OF RELIGIOUS INTEREST <sup>b</sup>	BIRTHS PER 100 COUPLES BY PLANNING STATUS <sup>a</sup>									
	For Statements By Wives					For Statements By Husbands				
	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
ALL COUPLES	203	106	228	199	296	203	106	228	199	296
<i>Extent Last Child Encouraged By Religious Duty</i>										
Very Little or Little	211	130	224	195	292	211	142	216	200	280
Some	217	141	232	215	275	216	124	261	187	315
Much or Very Much	242	150	262	212	349	238	113	e	221	338
<i>Interest in Religion: Since Marriage</i>										
Very Little or Little	188	84	170	192	325	193	97	215	182	277
Some	204	103	231	202	286	196	92	223	200	296
Much	208	115	237	199	294	216	153	242	213	303
Very Much	211	135	254	201	286	251	134	275	227	360
<i>As a Child</i>										
Very Little or Little	192	98	190	218	281	201	102	216	192	307
Some	193	113	234	186	284	205	107	228	203	294
Much	198	99	217	184	296	196	104	248	188	290
Very Much	226	108	248	228	314	214	120	220	230	289
<i>Church Attendance As a Child</i>										
Very Seldom or Seldom	200	e	e	e	e	217	94	e	200	325
Sometimes	206	100	e	200	300	201	94	219	185	298
Often	193	99	236	189	271	204	107	253	199	280
Regular	206	110	231	199	308	200	111	216	204	300
<i>Are Week-Day Activities All Right on Sunday Too?</i>										
Definitely or Probably No	191	90	210	193	297	192	104	216	189	276
Doubtful	224	132	279	205	300	211	108	228	204	299
Probably or Definitely Yes	211	122	230	207	292	222	112	252	217	337

<sup>a</sup> For number of couples on which rates are based see Appendix 2, Table 17.

<sup>b</sup> See Appendix 3 for specific questions to which statements are replies.

<sup>c</sup> Rates not computed for less than 20 couples.

Table 12. Births per 100 couples by fertility-planning status and by statements of wives and husbands about reasons for religious interest.

ANSWERS TO QUESTION: HOW IMPORTANT IS EACH OF THESE BELIEFS IN ACCOUNTING FOR YOUR INTEREST IN RELIGION OR CHURCH ACTIVITIES?	BIRTHS PER 100 COUPLES BY PLANNING STATUS <sup>a</sup>									
	For Statements by Wives					For Statements by Husbands				
	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
<b>ALL COUPLES:</b>	203	106	228	199	296	203	106	288	199	296
<i>Churches Provide Social Life</i>										
No Importance	183	125	b	200	249	199	117	b	178	306
Little Importance	196	88	216	200	300	198	89	219	197	277
Some Importance	195	106	224	190	281	186	90	219	191	262
Much Importance	231	100	225	212	341	223	138	247	214	343
Great Importance	213	109	263	205	300	231	109	248	222	338
<i>Churches are Centers of Useful Activity</i>										
No Importance	176	104	b	b	b	226	140	b	b	329
Little Importance	194	108	245	184	317	185	71	b	195	261
Some Importance	198	95	218	211	298	192	99	228	189	264
Much Importance	207	117	211	193	297	204	124	214	209	292
Great Importance	213	116	260	200	294	225	102	253	211	361
<i>Religion Helps One Lead a Better Life</i>										
No Importance	159	b	b	b	b	179	b	b	b	b
Little Importance	145	b	b	b	b	170	67	b	146	256
Some Importance	171	79	203	166	282	197	96	232	184	279
Much Importance	202	102	219	199	290	191	119	221	190	261
Great Importance	216	120	239	208	306	222	109	240	221	337
<i>Religion Brings Fellowship with God</i>										
No Importance	163	b	b	b	b	203	b	b	b	b
Little Importance	156	b	b	b	b	166	116	b	b	b
Some Importance	177	110	196	174	276	190	68	232	188	269
Much Importance	197	93	212	208	292	194	125	221	191	262
Great Importance	215	111	240	205	300	218	109	229	213	330
<i>Religion Prepares for Eternal Life</i>										
No Importance	146	b	b	b	b	180	96	b	170	307
Little Importance	175	b	b	b	b	178	103	b	168	262
Some Importance	178	92	217	171	281	196	116	224	188	271
Much Importance	197	99	228	203	294	191	121	240	191	251
Great Importance	216	112	237	208	303	218	100	234	217	323
<i>Religion Helps Build a Better World</i>										
No Importance	b	b	b	b	b	181	b	b	b	b
Little Importance	b	b	b	b	b	192	b	b	b	b
Some Importance	163	112	b	148	260	193	90	222	179	277
Much Importance	201	84	b	197	320	185	105	225	200	238
Great Importance	207	111	234	204	293	212	110	231	205	320

<sup>a</sup> For number of couples on which rates are based see Appendix 2, Table 18.

<sup>b</sup> Rates not computed for less than 20 couples.



comparisons yield results consistent with the hypothesis. On the basis of the responses of the husbands, forty-two out of fifty-six comparisons are consistent.

The fertility rates for groupings based on the Religious Interest Index are shown in Table 6. For the sample as a whole,

Table 13. Births per 100 couples by fertility-planning status and by statements of wives and husbands about religious experience of their children.

AMOUNT OF RELIGIOUS EXPERIENCE OF CHILDREN	BIRTHS PER 100 COUPLES BY PLANNING STATUS <sup>a</sup>				
	Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
ALL COUPLES WITH CHILDREN :	224	155	233	201	296
<i>Wives</i>					
<i>Frequency Children Have:</i>					
<i>Attended Church or</i>					
<i>Sunday School?</i>					
Seldom	174	<sup>b</sup>	<sup>b</sup>	149	224
Fairly often	223	142	223	202	306
Regularly	232	169	244	210	301
<i>Said Prayers at Bed-Time?</i>					
Seldom	250	142	222	204	343
Fairly often	223	156	237	200	296
Regularly	212	159	235	201	262
<i>Heard Grace at Meals?</i>					
Seldom	214	146	215	197	283
Fairly often	240	165	232	204	321
Regularly	230	167	268	206	299
<i>Husbands</i>					
<i>Frequency Children Have:</i>					
<i>Attended Church or</i>					
<i>Sunday School?</i>					
Seldom	198	142	222	180	246
Fairly often	218	141	211	194	290
Regularly	235	168	252	212	319
<i>Said Prayers at Bed-Time?</i>					
Seldom	233	151	228	203	316
Fairly often	232	169	236	205	294
Regularly	205	148	235	194	271
<i>Heard Grace at Meals?</i>					
Seldom	219	152	216	202	287
Fairly often	228	148	244	202	307
Regularly	232	170	264	198	314

<sup>a</sup> For numbers of couples on which rates are based, see Appendix 2, Table 19.

<sup>b</sup> Rates not computed for less than 20 couples.

the fertility rate increases regularly from the lowest through the middle to the highest Religious Interest Index group. For each of the four planning status categories rates were computed for 2 groupings based on the Religious Interest Index. For each planning status category, except "excess fertility," the fertility rate is highest for the highest religious interest category.

Fertility rate comparisons may also be made for the two extreme religious interest groups, previously described, constructed by cross-classifying answers to two or three questions. On the basis of the response of wives, sixty-four couples in the

Table 14. Births per 100 couples by reason rated as "most important for having last child."

REASON RATED AS MOST IMPORTANT	BASED ON RATINGS BY WIFE		BASED ON RATINGS BY HUSBAND	
	Number of Couples	Births Per 100 Couples	Number of Couples	Births Per 100 Couples
ALL COUPLES*	1,354	216	1,357	216
A Strong Liking for Children	667	201	593	206
A Belief that it is a Religious Duty to Have a Family	30	247	47	247
The Traditional Belief that Married Couples Ought to Have Children	123	260	124	246
A Feeling that it is Important to Carry on the Family Name	8	b	29	210
A Desire to See What Own Children Would be Like	68	150	47	140
A Feeling that Children Bring Husband and Wife Closer Together	147	228	244	207
Not Wanting an Only Child	167	203	131	215
Not to be Left Childless in Case of Death of Only Child	14	b	5	b
The Desire of Children for More Brothers and Sisters	32	269	21	262
Wanting a Girl if Only Had Boys, or a Boy if Only Had Girls	71	282	75	273
Unknown	27	278	41	236

\* Includes all couples who had a live birth and all childless couples with wife pregnant at time or respondent indicating intention to have a child in future. Forty-eight childless couples are included on basis of response of wife and 45 on basis of response of husband.

b Rates not computed for less than 20 couples.

"low" religious interest group have a fertility rate of 184. At the other extreme, the fertility rate is 250 for the forty-two couples in the "high" religious interest category on the basis of the wives' responses.

Among those couples having "some" or "much" interest in religion, a comparison was made between those who attribute "little" and those who attribute "much" importance to "preparation for eternal life" as the basis for their religious interest. The following tabulation shows higher fertility rates for those attributing "much" importance to this reason:

Importance of "Preparation for Eternal Life" as a Reason for Interest in Religion:

<i>Reply of Wife</i>	<i>No. of Couples</i>	<i>Births per 100 Couples</i>
Little Importance	190	179
Much Importance	964	213
<i>Reply of Husband</i>		
Little Importance	220	187
Much Importance	731	214

Table 14 indicates that the couples for whom either husband or wife indicated "religious interest" as the most important reason for having the last child have a fertility rate considerably higher than the rate for the sample as a whole. This is true even if the comparison is made only with couples who had a child.

The hypothesis is concerned specifically with the size of *planned* families, because in the case of such families the relationship between religious interest and family size is not obscured by variations in the effectiveness of contraceptive practice. Although a certain amount of planning is found in each of the four planning status categories, the number of children is completely planned only in the categories "number and spacing planned" and "number planned." The tendency toward a direct relationship between degree of religious interest

and size of family planned is found in both of these categories, if we compare only extreme categories of religious interest. However, this relationship is about the same within each of the two other planning status categories. The number of items for which the comparisons of extremes are consistent with the hypothesis is about the same for the four planning categories. Further, the size of the differences in such comparisons does not vary consistently with planning status.

The relationship of religious denomination and fertility is treated separately here, because it involves special problems. The fertility rates of the couples classified by religious denominations are shown in Table 4. In general, the denominational groups with low fertility rates are those already found to have a high percentage of "effective planners." There is a close inverse relationship between the ranking of the denominational groups on fertility rates and their ranking on percentage of "effective planners." For denominations of either wives or husbands, there are only two cases in which the rank position of the denomination on percentage of "effective planners" (ranked from high to low) is more than one rank from the position on fertility rates (ranked from low to high). The highest fertility rates are for the United Brethren and a group of "fundamentalist" sects. (This is true for denomination of either husband or wife.) These two groups have already been shown to have the lowest socio-economic status, and the lowest percentage of "effective planners." The three lowest fertility groups are the Christian Science, Presbyterian, and the "Evangelical" groups. The Presbyterian group has the highest percentage of "effective planners" and the highest socio-economic status. The "Evangelical" group has a very high percentage of "effective planners" and an intermediate position on socio-economic status. The Christian Science group is intermediate on both socio-economic status and percentage of "effective planners." The low fertility rate of the Christian Science group appears anomalous in terms of our hypothesis, since this group places an extreme emphasis on faith in its theology. However,

other elements of the religious background of this group make it difficult to classify. In any case its position on fertility may be a "chance" phenomenon, since the size of the sample is very small.

The remaining religious denominations in the middle of the range do not differ widely in their fertility rates.

The close relationship between the extent of planning fertility and the fertility rates of the denominations makes it desirable to control planning status in examining the relationship between fertility and religious denomination. The size of the sample made it possible to do this only for the four largest denominations. The results are shown in Table 15.

The most significant finding from this table is that the Presbyterian group, which has the lowest total fertility rates for the four denominations, has the highest fertility rates in the two effective planning categories. This is consistent with the Kiser-Whelpton finding that while socio-economic status and fertility are inversely related in the categories of least effective planning, they tend to be directly related in the most effective

Table 15. Births per 100 couples by fertility-planning status for four religious denominations of wives and husbands.

RELIGIOUS DENOMINATION	BIRTHS PER 100 COUPLES BY PLANNING STATUS <sup>a</sup>				
	Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
<i>Denomination of Wife</i>					
Presbyterian	171	134	242	182	245
Christian	201	105	236	194	289
Methodist	214	124	219	199	301
Baptist	201	97	203	174	280
<i>Denomination of Husband</i>					
Presbyterian	185	133	229	186	257
Christian	204	108	225	201	284
Methodist	204	113	221	193	298
Baptist	199	89	219	197	272

<sup>a</sup> For numerical distributions see Appendix 2, Table 20.

planning categories. The Presbyterians have a much higher concentration in the upper socio-economic status categories, while the three other denominations have a fairly similar intermediate socio-economic status distribution. Thus, among those couples who plan effectively, the religious denomination characterized by the highest socio-economic status has a relatively high fertility rate. These findings suggest that the comparison of fertility rates by denomination is not very useful for analysis, if it is not possible to take planning status (or socio-economic status) into account. Unfortunately, our sample for the denominations, other than the four largest, is too small to make this possible.

Theoretically, it should be possible for the effectively planned families with a great degree of religious interest to have fertility rates as high as or higher than those of the families in planning status categories in which planning is less com-

Table 16. Births per 100 couples, by importance to wife of "religion gives fellowship with God" as reason for religious interest, and by socio-economic status of the couples.

INDEX OF SOCIO-ECONOMIC STATUS	IMPORTANCE OF "RELIGION GIVES FELLOWSHIP WITH GOD" AS REASON FOR INTEREST IN RELIGION					
	All Wives	No Importance	Little Importance	Some Importance	Much Importance	Great Importance
BIRTHS PER 100 COUPLES						
ALL COUPLES	203	163	156	177	197	214
0-19	171	a	a	167	142	187
20-29	156	a	a	128	153	173
30-39	182	a	a	166	192	184
40-49	198	a	a	164	202	206
50 and over	309	a	a	a	278	314
NUMBER OF COUPLES						
ALL COUPLES	1,444	27	27	192	367	831
0-19	224	11	6	49	52	106
20-29	243	8	2	50	62	121
30-39	323	8	11	85	74	200
40-49	403	2	6	39	111	245
50 and over	251	3	2	19	68	159

a Rates not computed for less than 20 couples.



plete. The question is whether interest in religion leads some of the couples who completely plan family size to have as many children as the couples whose families are not completely planned. The data indicate that this is not the case. Among the "number and spacing planned" couples the highest fertility rate for any religious interest group (based on response of wife) is lower than the lowest fertility rate for any religious interest group in any other planning-status group for thirteen out of fourteen religious interest items, for the Religious Interest Index, and for religious denomination. On the basis of the responses of the husbands, this is true for every religious interest item and for religious denomination. Thus, while there is some tendency for religious interest to be positively associated with higher fertility among planned families, the relationship is not as strong as the negative relationship of fertility and planning status. Planned families tend to be small regardless of religious interest or denomination.

The number of cases in the total sample is too small to permit simultaneous cross-classification of socio-economic status and planning status by degrees of religious interest. However, one experimental tabulation was made to show the relationship of a religious interest variable (importance of "fellowship with God" as a reason for religious interest) and fertility within the five socio-economic status groups. The results based on the response of wives are shown in Table 16. These data indicate that the highest religious interest category in each socio-economic status group has a higher fertility rate than the lowest religious interest category.<sup>29</sup> Again, the position of the middle religious-interest category is erratic.

#### SUMMARY

This article is a report on an investigation of the hypothesis that "the greater the interest in religion, the lower the proportion of couples practicing contraception effectively and the larger the planned families."

<sup>29</sup> The results based on the response of husbands are essentially similar.

A slight negative relationship exists between the effective practice of contraception and degree of religious interest as determined in this study. However, this relationship is mainly a function of socio-economic status. It is not maintained with any consistency within categories based on an Index of Socio-Economic Status. Religious denomination is more closely related to effective planning than is any of the other indices of religious interest or activity which were utilized. In general the religious groups with a "liberal" theology or a background of emphasis on the "Protestant Ethic" tend to have high percentages of "effective planners." A large part, if not all, of the relationship between denomination and effective planning is a function of the distinctive socio-economic status of the different denominations.

There is a direct relationship between religious interest and fertility, if only the extreme categories of religious interest are compared. It is not evident in regular gradations of fertility in intermediate categories. However, the relationship for extreme religious interest categories does exist within each planning-status group. The relationship is not more pronounced for the effective-planning groups than for the others.

Fertility also varies with religious denomination. There is a close inverse relationship between the rank of a denomination on percentage of effective planners and its rank on fertility rate. The only notable exception is the Christian Science group, which had the lowest fertility rate but an intermediate position on fertility planning.

Four denominations have a sufficiently large number of couples to make it worthwhile to compute fertility rates separately for each fertility planning status. The most significant finding here is that the Presbyterian group, which has the lowest total fertility rate among the four denominations compared, has the highest fertility rate in the two effective-planning categories. This is consistent with a Kiser-Whelpton finding that the negative relationship between socio-economic status and fertility is reversed for effective planners. The Pres-

byterian group has a much higher socio-economic status than any of the three other groups.

The direct relationship between religious interest and fertility is found to persist in each of the five socio-economic status categories, for the one religious item for which this tabulation was made.

On the whole, the findings do not indicate that religious interest is of great importance in explaining variations in reproductive behavior. Neither planning status nor fertility vary in regular gradation with religious interest or participation. It is only when comparisons of extreme religious interest groups are made that the findings indicate a small relationship consistent with the hypothesis. Even the small inverse relationship between fertility planning and religious interest has been shown to be mainly a function of socio-economic status.

Although the findings are mainly negative, they are documented in considerable detail in this study, since the hypothesis is one which has had considerable support from reputable students of the problem, and the data are unique.

It is important to emphasize that the generality of the findings is limited by the nature of the sample—a group of urban native-white Protestants with at least a complete grammar school education. It may be that among Protestants more heterogeneous in religious and cultural background, religious interest and participation may have a more important effect on reproductive behavior. Further, these findings are not necessarily inconsistent with fertility differences found between Catholics and Protestants, since a different range of religious belief and organization and other cultural factors enter into these differences. These findings are not necessarily inconsistent, either, with the hypothesis that religion is a factor in the high fertility of pre-industrial societies (e.g., the Orient), for religion has a far different place in such societies than in an American Middle-Western city.

## APPENDIX 1

## Reasons for Interest in Religion

The contingency coefficients for the relationship between importance attached to different pairs of reasons for interest in religion are as follows:

<i>Reasons</i>	Contingency Coefficients Based On Responses of:	
	<i>Wives</i>	<i>Husbands</i>
Churches Provide Social Life	.38	.39
Religion Prepares One for Eternal Life		
Churches Provide Social Life	.43	.40
Religion Brings Fellowship with God		
Churches Are the Center of Useful Activities	.39	.46
Religion Prepares One for Eternal Life		
Churches Are the Center of Useful Activities	.43	.49
Religion Brings Fellowship with God		

The two coefficients for the relationship between "churches are the center of useful activity" and "religion brings fellowship with God" are for tables with 5 rows and 5 columns. The coefficient for wives for "churches provide social life" and "religion prepares one for eternal life" is for a 4 row by 4 column table. All other coefficients are for 4 row by 5 column tables.

## APPENDIX 2

Table 17. Number of couples by fertility-planning status and by statements of wives and husbands indicating degree of religious interest.

DEGREE OF RELIGIOUS INTEREST	NUMBER OF HUSBANDS BY FERTILITY PLANNING STATUS					NUMBER OF WIVES BY FERTILITY PLANNING STATUS				
	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
ALL COUPLES*	1,444	403	205	454	382	1,444	403	205	454	382
<i>Existent Last Child Encouraged by Religious Duty</i>										
Very Little	720	161	108	237	214	699	161	117	231	190
Little	243	72	29	76	66	206	50	29	64	63
Some	223	51	40	73	59	260	62	41	91	66
Much	64	14	11	20	19	90	18	9	41	22
Very Much	104	20	15	45	24	102	29			
<i>Interest in Religion: Since Marriage</i>										
Very Little	139	53	8	33	45	275	87	7	25	41
Little	148	50	25	38	35	218	43	42	56	90
Some	597	149	77	203	168	621	179	84	86	58
Much	281	68	43	99	71	192	62	24	201	157
Very Much	278	82	52	81	63	138	32	24	67	39
<i>As a Child</i>										
Very Little	58	18	12	14	14	159	44	28	40	47
Little	92	27	18	24	23	217	64	23	72	58
Some	525	154	64	186	121	558	155	69	177	157
Much	380	108	47	110	115	339	94	50	119	76
Very Much	389	96	64	120	109	171	46	35	46	44
<i>Church Attendance as a Child</i>										
Seldom or Very Seldom	41	10	9	14	8	122	31	17	38	36
Sometimes	120	27	17	44	32	219	49	36	74	60
Often	355	103	44	102	106	404	113	47	121	123
Regularly	923	263	135	289	236	699	210	105	221	163
<i>Are Week-Day Activities All Right on Sunday Too?</i>										
Definitely Yes	255	75	41	80	59	390	109	61	102	118
Probably Yes	481	140	64	154	123	394	116	56	132	90
Doubtful	264	62	34	94	74	279	65	29	106	79
Probably No	263	62	33	85	83	232	66	37	69	60
Definitely No	181	64	33	41	43	147	45	22	45	35

\* Includes "unknown" responses to religious items.

Table 18. Number of couples by fertility-planning status and by statements of wives and husbands about reasons for religious interest.

ANSWERS TO QUESTION: HOW IMPORTANT IS EACH OF THESE BELIEFS IN ACCOUNTING FOR YOUR INTEREST IN RELIGION OR CHURCH ACTIVITIES?	NUMBER OF WIVES BY FERTILITY PLANNING STATUS					NUMBER OF HUSBANDS BY FERTILITY PLANNING STATUS				
	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility	Total	No. and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
ALL COUPLES <sup>a</sup>	1,444	403	205	454	382	1,444	403	205	454	382
<i>Churches Provide Social Life</i>										
No Importance	181	73	16	45	47	140	41	19	45	35
Little Importance	213	57	37	69	50	198	45	32	65	56
Some Importance	556	157	92	166	141	615	169	95	192	159
Much Importance	249	59	28	77	85	286	94	36	89	67
Great Importance	243	57	30	97	59	204	54	23	63	64
<i>Churches are Centers of Useful Activity</i>										
No Importance	63	24	10	12	17	78	20	17	17	24
Little Importance	121	40	20	38	23	127	34	14	43	36
Some Importance	495	154	83	133	125	564	146	80	186	152
Much Importance	418	100	47	149	122	379	110	56	128	85
Great Importance	337	83	43	118	93	296	93	38	80	85
<i>Religion Helps One Lead a Better Life</i>										
No Importance	22	8	4	8	2	52	18	12	13	9
Little Importance	38	18	7	8	5	92	27	9	22	34
Some Importance	217	75	29	56	57	293	77	50	80	86
Much Importance	374	100	43	122	109	410	113	43	155	99
Great Importance	793	202	122	260	209	595	166	91	184	154
<i>Religion Brings Fellowship with God</i>										
No Importance	27	14	2	9	2	38	14	7	8	9
Little Importance	27	5	13	8	1	68	32	1	17	18
Some Importance	192	69	26	55	42	280	68	47	82	83
Much Importance	367	109	33	124	101	385	107	42	140	96
Great Importance	831	206	131	258	236	671	182	108	205	176
<i>Religion Prepares for Eternal Life</i>										
No Importance	43	18	6	12	7	112	44	17	23	28
Little Importance	56	18	17	11	10	108	35	16	28	29
Some Importance	201	66	29	58	48	270	74	33	87	76
Much Importance	264	83	18	92	71	277	72	25	117	63
Great Importance	878	216	135	281	246	675	178	114	199	184
<i>Religion Helps Build a Better World</i>										
No Importance	10	4	2	4	..	31	13	3	6	9
Little Importance	11	2	2	1	6	39	9	4	13	13
Some Importance	110	40	18	27	25	188	49	27	52	60
Much Importance	216	68	15	68	65	280	82	36	93	69
Great Importance	1,095	289	166	354	286	906	250	135	290	231

<sup>a</sup> Includes "unknown" responses to religious interest items.



Table 19. Number of couples, by fertility-planning status and by statement of wives and husbands about religious experiences of children.

AMOUNT OF RELIGIOUS EXPERIENCE OF CHILDREN	FERTILITY PLANNING STATUS				
	Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
<b>ALL COUPLES WITH CHILDREN:*</b>	1,309	277	201	450	381
<i>Wives</i>					
<i>Frequency Children Have:</i>					
<i>Attended Church or Sunday School?</i>					
Seldom	105	17	13	41	34
Fairly Often	533	117	74	180	162
Regularly	670	143	114	229	184
<i>Said Prayers at Bed-Time?</i>					
Seldom	260	41	46	74	99
Fairly Often	537	112	73	202	150
Regularly	510	122	82	174	132
<i>Heard Grace at Meals?</i>					
Seldom	672	150	98	226	198
Fairly Often	322	49	53	117	103
Regularly	313	76	50	107	80
<i>Husbands</i>					
<i>Frequency Children Have:</i>					
<i>Attended Church or Sunday School?</i>					
Seldom	136	31	23	41	41
Fairly Often	572	103	75	205	189
Regularly	600	143	103	204	150
<i>Said Prayers at Bed-Time?</i>					
Seldom	451	83	71	155	142
Fairly Often	441	78	67	152	144
Regularly	416	116	63	143	94
<i>Heard Grace at Meals?</i>					
Seldom	738	160	113	241	224
Fairly Often	312	63	43	112	94
Regularly	258	54	45	97	62

\* Includes unknown responses of couples with children.

Table 20. Number of couples by fertility-planning status and by religious denomination of wives and husbands.

RELIGIOUS DENOMINATION	FERTILITY-PLANNING STATUS				
	Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
ALL COUPLES	1,444	403	205	454	382
<i>Denomination of Wife:</i>					
Congregational, Episcopal, Unitarian, Friends, Universalists	42	12	7	16	7
Christian Science	49	19	...	15	15
Presbyterian	146	56	24	44	22
Lutheran	78	27	10	24	17
Christian	242	60	47	81	54
Methodist	389	83	37	159	110
Evangelical,					
Evangelical-Reformed,					
Evangelical-Zions	53	19	14	9	11
Baptist	166	37	30	38	61
United Brethren	30	6	...	13	11
Church of Christ, Church of God, Church of 1st Born, Nazarene, Pentecostals	59	7	9	18	25
Miscellaneous <sup>a</sup>	37	12	8	9	8
Unknown, but Protestant	86	34	9	16	27
None <sup>b</sup>	67	31	10	12	14
<i>Denomination of Husband:</i>					
Congregational, Episcopal, Unitarian, Friends, Universalists	42	5	8	21	8
Christian Science	40	15	...	18	7
Presbyterian	140	54	28	37	21
Lutheran	69	27	8	20	14
Christian	245	53	48	88	56
Methodist	358	87	43	134	94
Evangelical,					
Evangelical-Reformed,					
Evangelical-Zions	50	21	8	9	12
Baptist	152	38	26	38	50
United Brethren	24	...	2	12	10
Church of Christ, Church of God, Church of 1st Born, Nazarene, Pentecostals	41	7	5	12	17
Miscellaneous <sup>a</sup>	44	14	9	10	11
Unknown, but Protestant	102	36	11	19	36
None <sup>b</sup>	137	46	9	36	46

<sup>a</sup> See footnote 16 for explanation of these groupings and categories.<sup>b</sup> Protestants without specific denominational preference.

Table 21. Number of couples by fertility-planning status and by religious interest index.

RELIGIOUS INTEREST INDEX	FERTILITY PLANNING STATUS				
	Total	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
ALL COUPLES	1,444	403	205	454	382
Under 40	32	9	7	10	6
40-49	86	44	9	9	24
50-59	299	74	41	99	85
60-69	541	155	66	178	142
70-79	376	86	66	125	99
80 and Over	110	35	16	33	26

## APPENDIX 3

The statements in the stub of Table 1 are alternative replies to the following questions:

1. How much did each of these reasons encourage you and your wife (husband) to have your last (to want a) child?:

A belief that it is a religious duty to have a child? (other reasons also rated are listed in Table 5)

2. How much have you been interested in religion since marriage?

3. How much were you interested in religion when you were 10 to 15 years old?

4. How often did you attend church or Sunday School when you were 10 to 15 years old?

5. If it is all right to do something on weekdays, is it all right to do it on Sundays?

## APPENDIX 4

Table 22. Level of significance of chi-square values for relationship between answers to religious-interest questions and the index of socio-economic status and fertility-planning status.

QUESTION	LEVEL OF SIGNIFICANCE OF CHI SQUARE FOR RELATIONSHIP TO			
	Index of Socio-Economic Status		Fertility-Planning Status	
	Wives	Husbands	Wives	Husbands
How Much Were You Encouraged to Have a Family by a Belief That It is a Religious Duty to Have a Family?	a	a	c	c
How Much Have You Been Interested in Religion:				
Since Marriage?	c	b	c	c
When You Were 10-15 Years Old?	c	c	c	c
How Often Did You Attend Church or Sunday School When You Were 10-15 Years Old?	c	a	c	c
If it is All Right to do Something on Weekdays is it All Right to do it on Sundays?	a	b	c	c
How Important is Each of These Beliefs in Accounting For Your Interest in Religion or Church Activities?				
Churches Provide Social Life	a	c	b	c
Churches are the Center of Useful Activities	c	b	c	c
Religion Helps One Lead a Better Life Day by Day	c	c	c	c
Religion Brings a Fellowship with God	a	a	b	c
Religion Prepares One for Eternal Life	a	a	b	c
Religion Helps Build a Better World	c	c	c	c
How Often Have Your Children (or How Often Will They Later, if Too Young Now):				
Attended Church or Sunday School?	c	c	c	c
Said Prayers at Bedtime?	c	b	b	b
Heard Grace at Meals?	b	a	c	c
Religious Denomination	a	a	a	a

a Chi square significant at .01 level.

b Chi square significant at .05 level.

c Chi square not significant at .05 level.

## APPENDIX 5

Table 23. Relationship of fertility-planning status of "relatively fecund" couples to frequency of wife's church attendance as a child, by index of socio-economic status.

INDEX OF SOCIO-ECONOMIC STATUS BY FREQUENCY OF WIFE'S CHURCH ATTENDANCE	NUMBER OF COUPLES	PER CENT DISTRIBUTION BY PLANNING STATUS				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
<b>ALL COUPLES</b>	1,444	100	27.9	14.2	31.4	26.5
<i>0-19: Socio-Economic Status</i>						
Total	224	100	48.7	14.7	24.6	12.1
Seldom and Sometimes	18*	...	...	...	...	...
Often	42	100	59.6	14.3	19.0	7.1
Regularly	161	100	47.2	14.9	24.2	13.7
<i>20-29: Socio-Economic Status</i>						
Total	243	100	39.1	18.5	30.9	11.5
Seldom and Sometimes	27	100	22.2	11.1	48.2	18.5
Often	65	100	47.7	10.8	29.2	12.3
Regularly	151	100	38.4	23.2	28.5	9.9
<i>30-39: Socio-Economic Status</i>						
Total	323	100	25.4	13.0	38.1	23.5
Seldom and Sometimes	39	100	17.9	17.9	33.4	30.8
Often	72	100	34.7	9.7	23.6	32.0
Regularly	210	100	23.8	13.3	43.4	19.5
<i>40-49: Socio-Economic Status</i>						
Total	403	100	21.8	11.2	32.5	34.5
Seldom and Sometimes	43	100	32.6	11.6	30.2	25.6
Often	110	100	18.2	12.7	30.9	38.2
Regularly	250	100	21.6	10.4	33.6	34.4
<i>50+: Socio-Economic Status</i>						
Total	251	100	11.6	15.9	27.9	44.6
Seldom and Sometimes	34	100	5.9	23.5	41.2	29.4
Often	66	100	3.0	15.2	36.4	45.4
Regularly	151	100	16.6	14.6	21.2	47.7

\* Percentages not computed for total less than 20.

APPENDIX 6

The classification of denominations was made on the basis of the following ranges of values for percentage of effective planners:

37.0 per cent or less	—"low planners"
37.1 per cent-47.0 per cent	—"middle planners"
47.1 per cent or more	—"high planners"

On the basis of the religious denomination of the wife, the classification of the groups is as follows:

Low planners: Methodist; United Brethren; Extreme Fundamentalist.

Middle planners: Christian Science; Christian; Baptist; Combined Congregational, Episcopal, Unitarian, Friends, Universalist.

High planners: Presbyterian, Lutheran, Moravian, Evangelical, Misc.

The classification on the basis of the denomination of the husband is exactly the same except that the combined group (Congregational, Episcopal, Unitarian, Friends, Universalist) is in the "low planners" group for husbands.



# ANNOTATIONS

## MENTAL HEALTH IN MODERN SOCIETY<sup>1</sup>

WORLD WAR II has brought forth an awareness of the high incidence of mental and emotional disorders that exist in the United States. More than 680,000 men were discharged from our armed forces because of psychiatric illness or inability to adapt to military life. It may be expected that the total number of World War II veterans who will suffer from some kind of psychiatric illness will probably increase in the next twenty-five to thirty years. Thus, to the sizable civilian group who exhibit latent or overt symptoms of dysfunction, we must now add the hundreds of thousands of people for whom war was a traumatic and completely disorganizing experience.

MENTAL HEALTH IN MODERN SOCIETY attempts to show how the information and skills acquired in treating and preventing mental disorders in the armed forces may now be applied to the enormous problem of building sound mental health in our society. If this problem is to be met successfully, not only psychiatry but many other professional groups will have to rise to the occasion. All the knowledge and resources of the fields of sociology, anthropology, education, social work, medicine, and various community agencies will have to be pooled if prevention and treatment of mental ill health is to become a reality.

The authors clearly bring out the fact that powerful factors operate against mental health in our society as it is now constituted. In the military mode of life and especially after the return of the veteran to the civilian setting, the family, job, and the community configuration proved to be forces of great im-

<sup>1</sup> Rennie, Thomas A. C. and Woodward, Luther E.: MENTAL HEALTH IN MODERN SOCIETY. The Commonwealth Fund, New York, 1948, 424 pp.

port, directly affecting personal adjustment. Therefore, we shall have to learn how to remove or alleviate stresses found in the environment, as well as how to take positive measures to strengthen the inner resources of individuals.

Since mental ill health is, to a large degree, socially conditioned, to foster mental well-being, it will be necessary to give attention to groups as well as individuals. There are many faulty attitudes in our present-day society with regard to mental illness. Shame, ridicule, and stigma are still attached to mental disorder, and there is a tendency to hold the disordered person as being solely responsible for the illness. If any positive goals of mental hygiene are to be realized, a vigorous program of public education is clearly indicated.

Many lines of activity will be needed to deal adequately with these mental health problems. Immediate needs are for research, more facilities for treatment of the mentally ill, and the training of greatly increased numbers of psychiatrists, psychiatric social workers, psychiatric nurses, clinical psychologists, and occupational and recreational therapists.

These are some of the issues brought up in *MENTAL HEALTH IN MODERN SOCIETY*. Individual case histories, with a personality picture and details of the subsequent treatment given, are also presented. In their zeal, the authors have covered a vast area including some very well-founded suggestions. Here and there it would have been wise to add a sprinkle of salt. Many details could have been left out without detracting in any way from the main content of the book.

KATHERINE SIMON

• • •

### STUDIES IN POPULATION<sup>1</sup>

FOR the first time in its eighteen years of existence, the Population Association of America has published the proceedings of an annual meeting. The present volume, covering the 1949 meetings in Princeton, New Jersey, is a neatly prepared one of

<sup>1</sup> Mair, George (Editor): *STUDIES IN POPULATION*. Proceedings of the Annual Meeting of the Population Association of America at Princeton, New Jersey, May, 1949. Princeton University Press, 1949, 170 pp. \$2.50.

some 170 pages containing 24 papers arranged in five sections as follows:

- I. Application of Demographic Data to Current Problems (5 papers).
- II. Tools for Demographic Research (5 papers).
- III. Resources for the World's People (4 papers).
- IV. Value System and Human Fertility (4 papers).
- V. Future Courses of Research in Fertility (6 papers).

The editor labels the volume as an experiment. It was motivated by the desire to preserve "much material potentially useful to demographers and workers in associated fields," which with no provision for publication of proceedings might never be put into print. This aspiration was amply fulfilled with this publication. Constructive ideas and new demographic approaches, which frequently are expressed during the meetings of the Population Association of America, are certainly badly needed by the demographers all over the world.

The major emphasis of this meeting was on the discussion of human fertility and its associated factors. This seems appropriate, for fertility is generally regarded as the most important element in the contemporary population crisis. The other two elements, mortality and migration, are believed to be more easily controlled with present scientific knowledge and social mechanisms than fertility, which is more rigidly linked with religious beliefs and traditional habits.

The paper by the Reverend William J. Gibbons, S.J. (*The Catholic Value System in Relation to Human Fertility*) provides a good illustration of the religious factor in maintaining high levels of fertility. It affords an account of the position of the Catholic Church on specific forms of family limitation.

The influence of customs and traditions in maintaining high fertility was treated by Irene Taeuber (*The Reproductive Mores of the Asian Peasant*) and Josiah Russell (*Demographic Values in the Middle Ages*). Lack of statistical data and similar demographic reactions put in a parallel line both the contemporary Asian peasant and medieval European populations. High fertility and high mortality keep the balance of births

over deaths on a precarious level, as fertility cannot always adequately meet the excessive mortality. An estimated gross reproduction rate of over 4.0 among the Asian peasants is reduced by the intense mortality to a little over the replacement level (net reproduction rate of 1.2 to 1.6). However, one can find significant evidence that present mortality is declining. Will fertility follow soon? Mrs. Taeuber has no doubt that it will. The pressure of modernization is a stimulus too powerful to be resisted by any religious belief or traditional mores.

A good illustration of this was offered by Clarence Senior (*An Approach to Research in Overcoming Cultural Barriers to Family Limitation*) by referring to the spread of postpartum sterilization in Puerto Rico.

Dr. Howard C. Taylor, Jr. (*Physiological Factors and Their Control*) summarized the physiological aspect of conception. Ovulation, which occurs around the 14th day of the menstrual cycle, is accompanied by a slight but detectable rise of body temperature. The average life of both sperm and ovum does not exceed a period of two to four days. This leads to the inference that conception is scarcely possible before the 8th or after the 20th day of a 28-day menstrual cycle. On the other hand, a natural control of abundant fertility is constantly going on as at least one-tenth and perhaps one-fifth of all pregnancies terminate in spontaneous abortion. Until recently it was believed that this wastage was due to congenital defects in the primitive cells of the ovary or testis. More recent research has revived the theory that abortion frequently arises from unfavorable uterine environment.

In the discussion of the future course of research, studies of the type made in Indianapolis<sup>2</sup> were praised. According to Ira Reid (*Needed Research on Fertility of Negroes*) it may be necessary to expand such studies in order to include different racial communities defined on the basis of some social criteria. Wilson H. Grabill (*The Future Course of Research in Fertility*)

<sup>2</sup> See Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. IV. Developing the Schedules and Choosing the Type of Couples and the Area to be Studied. The Milbank Memorial Fund *Quarterly*, October, 1945, xxiii, No. 4, pp. 386-409.

suggested more use of distributional analysis to supplement rate analysis in studies of fertility. The trend towards two children as the modal size of family for women of completed fertility is a significant fact. It suggests that there is a limiting value in the decline of the birth rate and also that a virtual end to the spread of the small family system may be expected within a few decades.

Progress in understanding the social aspects of human fertility is mainly dependent on special studies, Ronald Freedman (*Some Aspects of Research in Differential Fertility*). The small family deviant in the socio-economic group of high fertility and *vice versa* will indicate the attitudes and characteristics required for a reduction of fertility. A secular detachment from traditional values is needed in order to achieve a rational planning of family size. Finally, Dr. Moya Woodside (*The Psychiatric Approach to Research Interviewing*) called for more psychological training of the interviewer in order better to trace demographic trends and to secure a better understanding of attitudes relating to family size.

Mr. T. J. Woofter (*Recent Proposals for Modifying the Net Reproduction Rate*) and Mr. John Hajnal discussed the *pros* and *cons* of the new indices of reproduction. The conventional net reproduction rate cannot well represent the future, while the generation rate cannot adequately measure the flow of present fertility. A whole series of such rates may be designed, taking account of age-sex differentials in nuptiality and mortality or being adjusted for duration of marriage, children ever born or birth order, etc. Each such rate answers a particular need. No single rate can suit all purposes. The conventional reproduction rate, however, probably gives an answer to the question most frequently asked.

Mr. Seymour L. Wolfbein (*The Length of Working Life*) gave a summary of his work on a table of working life in which the population surviving at age 14 and later years is treated in accordance with rates of accessions to and separation (on account of death or retirement) from the labor force. Finally, the average number of remaining years of work is compared with the expectation of life at different ages, thus giving the average

number of years of retirement, which, as Mr. A. J. Jaffe pointed out, may prove to be a highly valuable social and cultural index.

Mr. Paul H. Jacobson presented an analysis of marital dissolution in the United States, pointing out that while dissolutions caused by death of either spouse have declined from 30 per 1,000 couples in 1890 to less than 20 at present, those caused by divorce are on the upward trend with marked acceleration during recent years, influencing mostly the recently married couples.

Dr. Christopher Tietze reported on a series of 363 illegal abortions induced by physicians; his report apparently is unique in American medical literature.

Mr. Ross A. Eckler gave some interesting points on the development of the current population survey of the Bureau of the Census, which is a continuous miniature census covering some 25,000 households every month. Mr. Calvin F. Schmid explained the system of census divisions as established in the State of Washington.

Three interesting papers were read at the dinner session by J. D. Black (*Population and Scarce Food Resources*); R. Bradfield (*Soil Resources and the World's Potential Food Supply*); and G. R. Clapp (*Management of Resources in the Tennessee Valley*). A fourth paper by W. S. Thompson (*Some Reflections on World Population and Food Supply During the Next Few Decades*) was added in the proceedings. These papers afford various views on the highly controversial problem of resources for the world's people.

Finally, the reviewer can hardly resist expressing a sincere hope that the publishing of proceedings of the annual meetings of the Population Association of America will be continued. It would seem to be especially desirable until the time comes when a periodical similar to the English *Population Studies* and the French *Population* will fill the present gap in American demographic literature.

VASILIOS G. VALAORAS, M.D.





CHAPTER I

THE HISTORY OF THE UNITED STATES OF AMERICA

FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME

BY JAMES OGDEN, ESQ. OF NEW-YORK

IN TWO VOLUMES. VOL. I.

LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE HISTORY OF THE UNITED STATES OF AMERICA

FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME

BY JAMES OGDEN, ESQ. OF NEW-YORK

IN TWO VOLUMES. VOL. I.

LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE HISTORY OF THE UNITED STATES OF AMERICA

FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME

BY JAMES OGDEN, ESQ. OF NEW-YORK

IN TWO VOLUMES. VOL. I.

LONDON: PRINTED BY J. JOHNSON, ST. PAUL'S CHURCH-YARD, 1773.

THE HISTORY OF THE UNITED STATES OF AMERICA

